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ABSTRACT

This is part one of a two-part SMSG elementary school text for third-grade students. The development of mathematical ideas in the text is grounded in appropriate experiences with things from the physical world and the immediate environment. Chapter topics include: (1) sets of points; (2) addition and subtraction; (3) describing points and numbers; and (4) arrays and multiplication. (MP)

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MATHEMATICS FOR THE ELEMENTARY SCHOOL

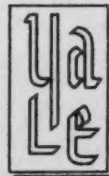
BOOK 3 PART I

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SCHOOL MATHEMATICS STUDY GROUP

YALE UNIVERSITY PRESS



Mathematics for the Elementary School

Book 3

Student's Text, Part I

REVISED EDITION

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Student's Text, Book 3

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Points and Curves

1. Mark five points below.

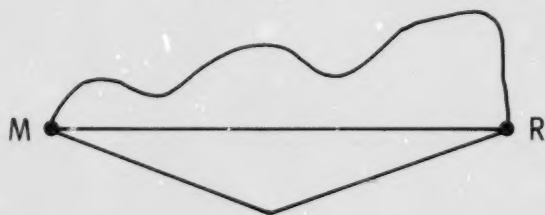
Name them with the first five letters of the alphabet.

2. Mark a point on each curve.

Name each point with a different letter of the alphabet.



3. Put the letter P on the picture of the straight curve from M to R.



Line Segments

1. Here is a picture of a line segment.



Write a name for this line segment. _____

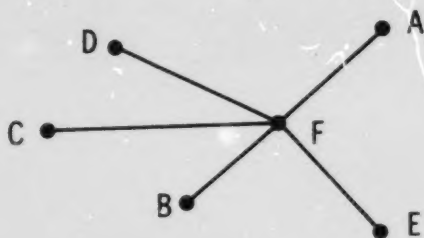
2. Draw a line segment with F and G as endpoints.



3. Write two names for the line segment above.

Line Segments

4. Here are some line segments that have point F as an endpoint.



One line segment is named below.

Name four other line segments.

AF _____

5. Draw two line segments that have point W as an endpoint.

Name these line segments $\overline{WX}$ and $\overline{WY}$.

Draw two more line segments that have W as an endpoint.

Name these line segments $\overline{WO}$ and $\overline{WP}$.

W
•

Can you draw more line segments with W as an endpoint? Yes No

Line Segments

6. Below are two points, A and B.

Draw line segment $\overline{AB}$.

A •

• B

How many line segments can you draw
that have the two endpoints A and B? _____

7. Here is line segment $\overline{MN}$.

Mark two points on $\overline{MN}$. Name them O and T.



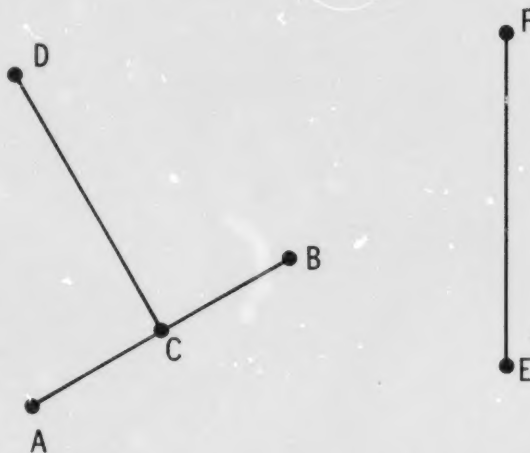
$\overline{MO}$ is one subset of $\overline{MN}$.

Name five other line segments that are subsets of line segment $\overline{MN}$.

$\overline{MO}$ _____

Congruence of Line Segments

1. Look at the segments below.



Do you think $\overline{AB}$ is congruent to $\overline{CD}$? Yes No

Compare $\overline{AB}$, $\overline{CD}$, $\overline{EF}$ and show below what you find.

Make a ring around the right answer.

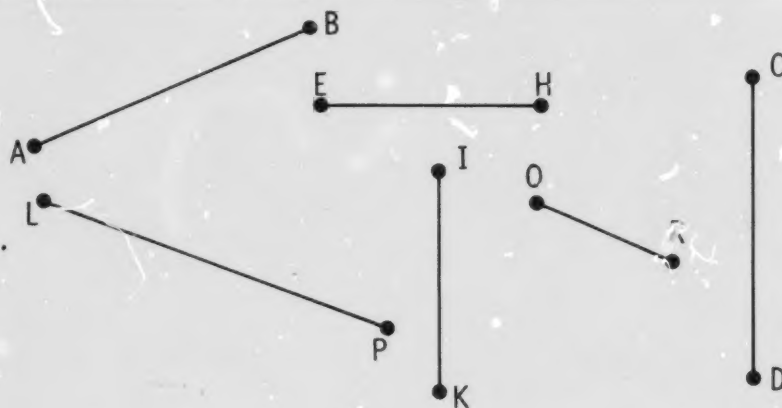
$\overline{AB}$ is congruent to $\overline{CD}$. Yes No

$\overline{AB}$ is congruent to $\overline{EF}$. Yes No

$\overline{CD}$ is congruent to $\overline{EF}$. Yes No

Congruence of Line Segments

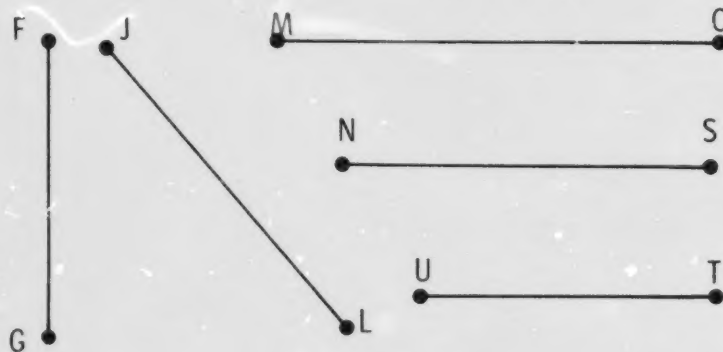
2.



$\overline{AB}$ is congruent to _____

$\overline{IK}$ is congruent to _____

3.

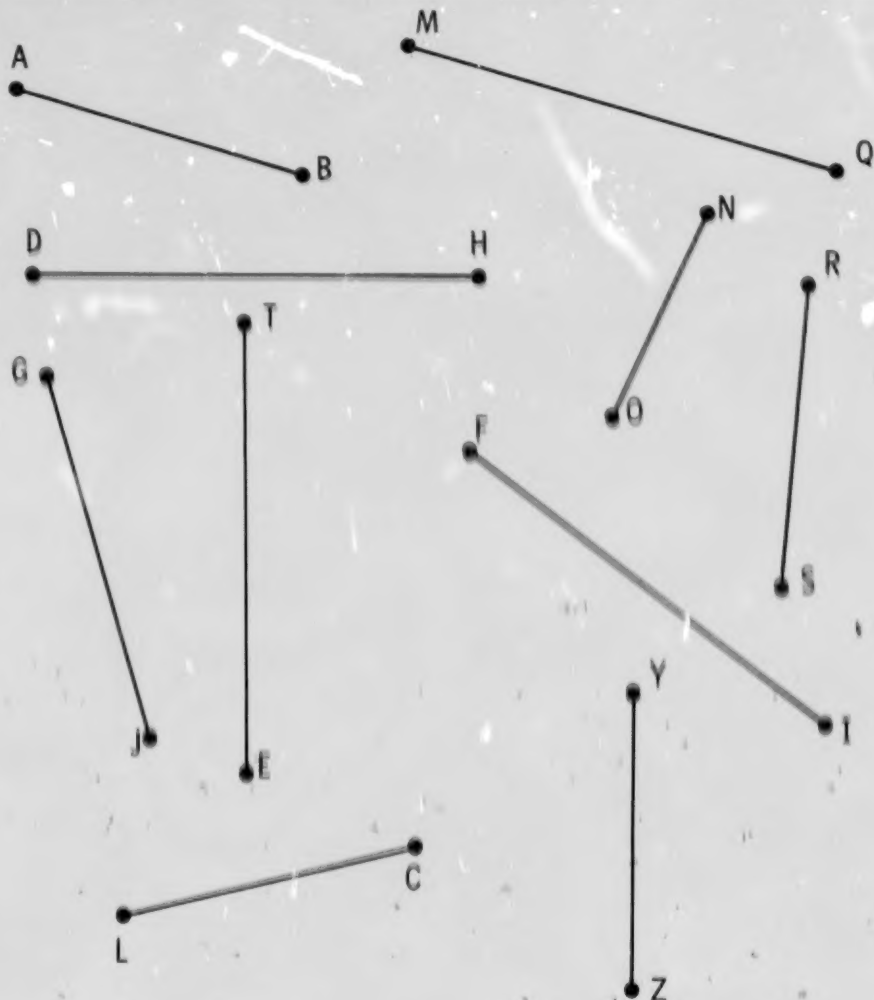


_____ is congruent to _____.

_____ is congruent to _____.

Congruence of Line Segments

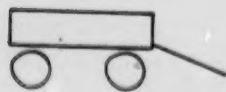
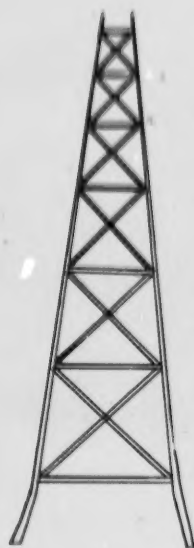
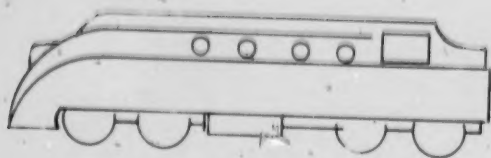
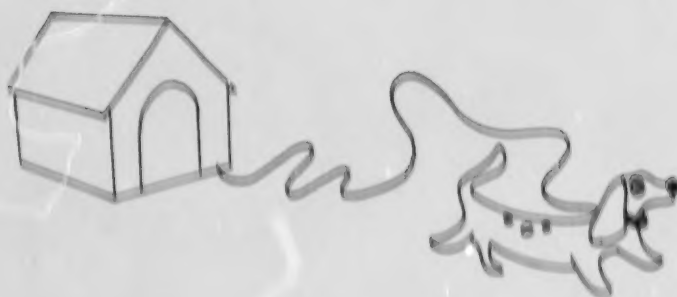
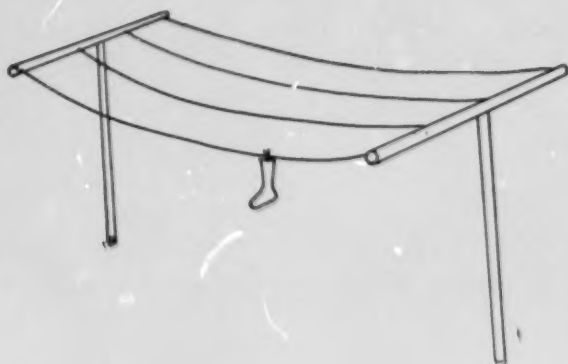
4.



$\overline{AB}$ is congruent to _____, _____, and _____.

$\overline{MQ}$ is congruent to _____, _____, and _____.

Review



Lines

1. Find the points E, C, A, B, D, and F named on the page.

Draw $\overline{AB}$.

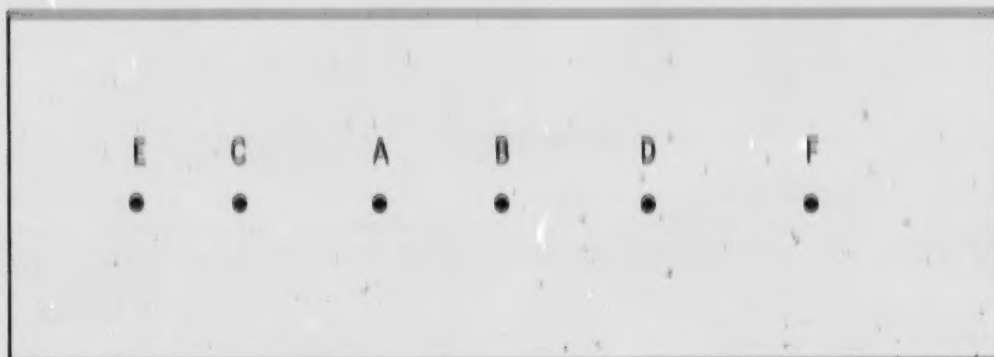
Draw $\overline{CD}$. Is $\overline{AB}$ a subset of $\overline{CD}$? Yes No

Draw $\overline{EF}$. The line segment $\overline{CD}$ is a subset of _____.

Draw $\overleftrightarrow{EF}$. Is $\overleftrightarrow{EF}$ a subset of $\overleftrightarrow{EF}$? Yes No

Is $\overleftrightarrow{EF}$ a subset of $\overleftrightarrow{EF}$? Yes No

Can you show all of $\overleftrightarrow{EF}$? Yes No



Some other names for $\overleftrightarrow{EF}$ are $\overleftrightarrow{CA}$, $\overleftrightarrow{AE}$, and $\overleftrightarrow{DF}$.

Write at least six other names below.

Lines

2. The point R is named below.

Draw five different lines through point R.

Mark and name another point on each line.



Name the lines you have drawn.

Can many more lines be drawn through R? Yes No

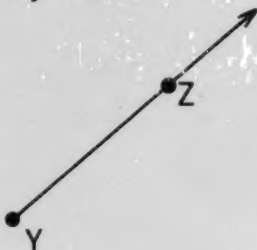
3. Mark two points below. Name them Q and Z.

Draw QZ.

Can you draw a different line through Q and Z? Yes No

Rays

1. Here is a picture of ray $\overrightarrow{YZ}$.



Name two points on $\overrightarrow{YZ}$. _____

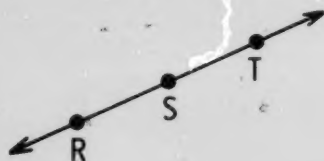
Name the endpoint of ray $\overrightarrow{YZ}$. _____

Is the endpoint named first? Yes No

Name a line segment in the picture. _____

Does $\overrightarrow{YZ}$ go on from $\overline{YZ}$ in one direction only? Yes No

2. Here is a picture of a line.



Name four rays on this line. _____

Are the endpoints named first? Yes No

Is $\overrightarrow{RT}$ another name for $\overrightarrow{TR}$? Yes No

Rays

3. Here is another line.



How many rays on the line can have A as an endpoint? _____

Name three line segments on the line that have A as an endpoint. _____

4. Draw a ray. Name it $\overrightarrow{AB}$.

Is $\overline{AB}$ a subset of $\overrightarrow{AB}$? Yes No

Is $\overrightarrow{BA}$ another name for $\overrightarrow{AB}$? Yes No

Rays

5. Mark the letter T as shown to complete each sentence correctly.

A line segment has

one endpoint _____

two endpoints T

no endpoints _____

A ray has

one endpoint _____

two endpoints _____

no endpoints _____

A line has

one endpoint _____

two endpoints _____

no endpoints _____

6. The point Q is marked below.

•
Q

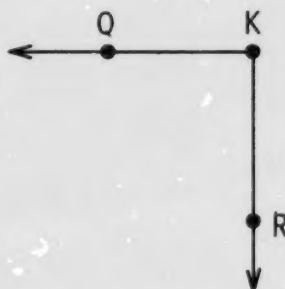
Draw five different rays above, each with endpoint Q.

Angles

1. Here are four rays.

The rays are named $\overrightarrow{AF}$, $\overrightarrow{AD}$, $\overrightarrow{KQ}$, and $\overrightarrow{KR}$.

These rays form two angles.



Name the two angles. _____

Give two other names for $\angle FAD$ and $\angle QKR$. _____

The vertex of $\angle FAD$ is point A.

Name the vertex of the other angle. _____

Mark a point C between K and R on ray $\overrightarrow{KR}$.

Now write two new names for $\angle QKR$. _____

2. Here is another angle.

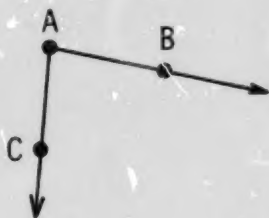


Name this angle. _____

Name its vertex. _____

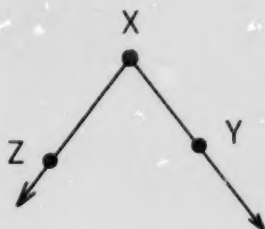
Angles

3. Name the vertex and the rays.



vertex _____

rays _____



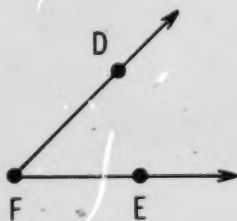
vertex _____

rays _____



vertex _____

rays _____

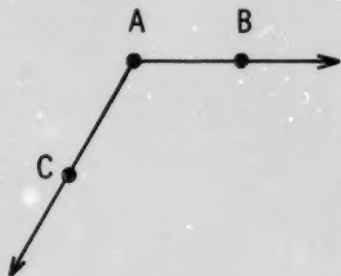


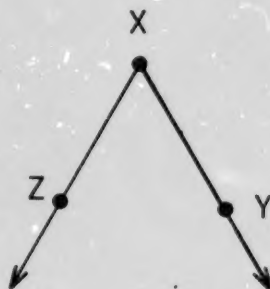
vertex _____

rays _____

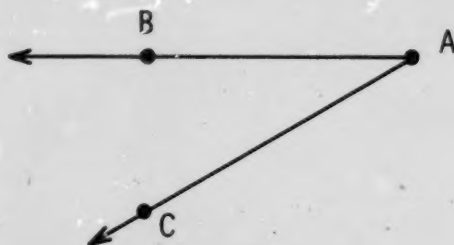
Angles

4. Write two names for each angle.





5. Below is a picture of $\angle BAC$.



Mark another point on $\overrightarrow{AB}$. Name it D.

Mark another point on $\overrightarrow{AC}$ and name it E.

Is $\overrightarrow{AB}$ the same ray as $\overrightarrow{AD}$? Yes No

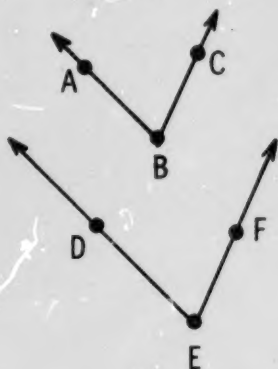
Is $\overrightarrow{AC}$ the same ray as $\overrightarrow{AE}$? Yes No

Is $\angle BAC$ the same angle as $\angle EAD$? Yes No

Is $\overline{BD}$ a subset of $\overrightarrow{AB}$? Yes No

Congruence of Angles

1.



Is $\angle ABC$ congruent to $\angle DEF$?

Yes No

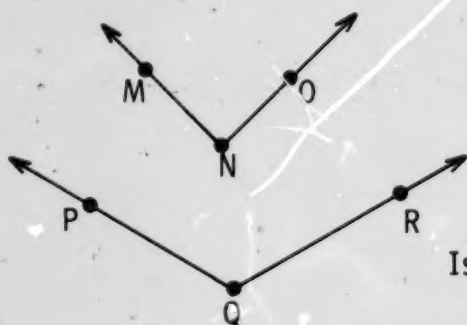
2.



Is $\angle GHI$ congruent to $\angle JKL$?

Yes No

3.

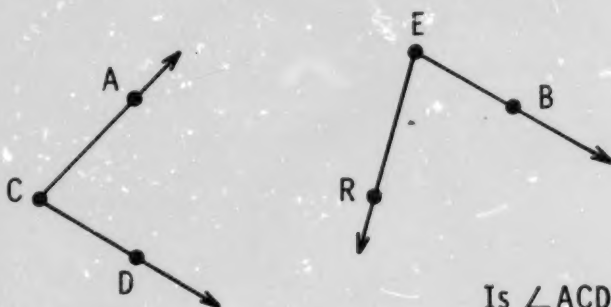


Is $\angle PQR$ congruent to $\angle MNO$?

Yes No

Congruence of Angles

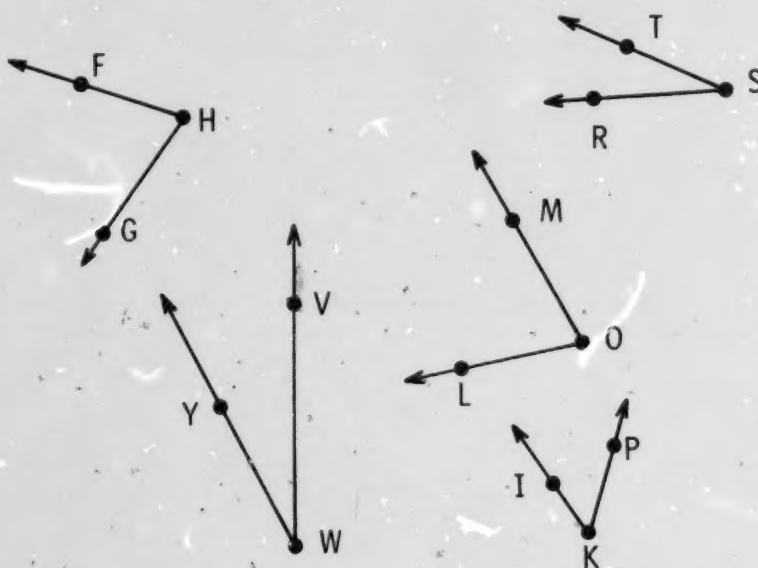
4.



Is $\angle ACD$ congruent to $\angle BER$?

Yes No

5.



$\angle$ _____ is congruent to $\angle$ _____.

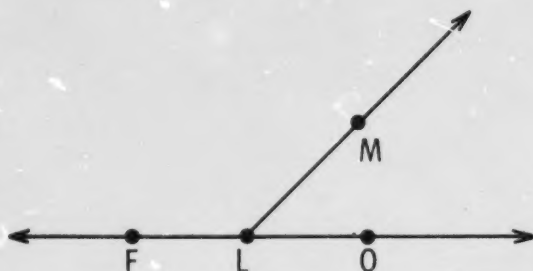
$\angle$ _____ is congruent to $\angle$ _____.

Right Angles and Congruence

1. The points F, L, and O lie on a line.

Make a tracing of one angle.

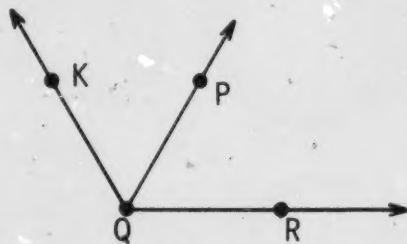
Test to see if the angles are congruent.



Are $\angle MLO$ and $\angle MLF$ congruent angles? Yes No

Are $\angle MLO$ and $\angle MLF$ right angles? Yes No

2. Test $\angle PQR$ and $\angle PQR$ to see if they are congruent.



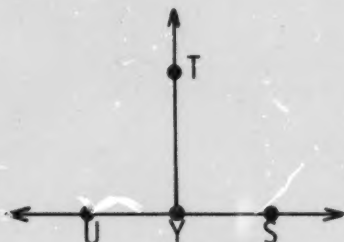
Are $\angle PQR$ and $\angle PQR$ congruent angles? Yes No

Do the points K, Q, and R lie on a line? Yes No

Are $\angle PQR$ and $\angle PQR$ right angles? Yes No

Right Angles and Congruence

3. Test $\angle TYS$ and $\angle TYU$ to see if they are congruent.

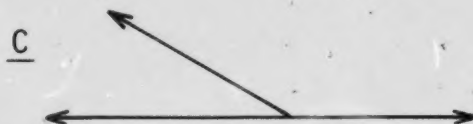
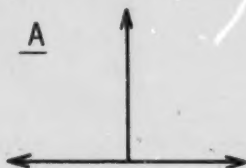


Are $\angle TYS$ and $\angle TYU$ congruent angles? Yes No

Do the points S, Y, and U lie on a line? Yes No

Are $\angle TYS$ and $\angle TYU$ right angles? Yes No

4. Here are three pairs of angles; the pairs are called A, B, and C.



Set B is one set of congruent angles.

Which other set looks like a pair of congruent angles? _____

Tell by looking which pair of angles could be right angles. _____

Tell by testing which other pair of angles are congruent. _____

Tell by testing which pair of angles are right angles. _____

Forming a Right Angle

5. Here is one way to form a right angle.

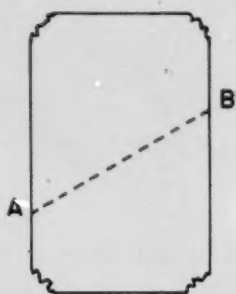
Step 1--Think about folding the sheet along $\overline{AB}$.

Step 2--Crease $\overline{AB}$ to show the line segment $\overline{AB}$.

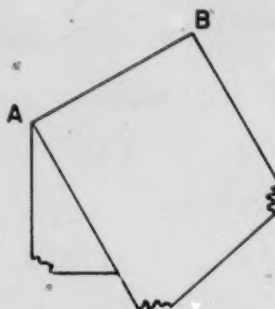
Step 3--Think about folding the paper along $\overline{CD}$ so that endpoint B fits exactly on A .

Step 4--Crease $\overline{CD}$ to show the line segment $\overline{CD}$.

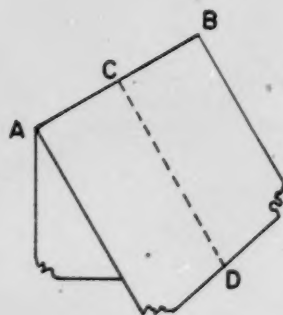
Step 1



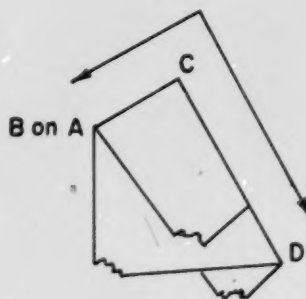
Step 2



Step 3



Step 4



Look at some of the curves and points we now have.

Segment $\overline{CA}$ is part of the ray _____ with endpoint C .

Ray $\overrightarrow{CA}$ and ray $\overrightarrow{CD}$ form a right angle.

The vertex of the right angle is _____.

Name the right angle. _____.

Right Angles

6. We can use our right angle to draw other right angles.

Below is ray $\overrightarrow{AB}$ with endpoint A.

Place the vertex of your right angle on point A.

Place one edge of your right angle along $\overrightarrow{AB}$.

Draw along the other edge.

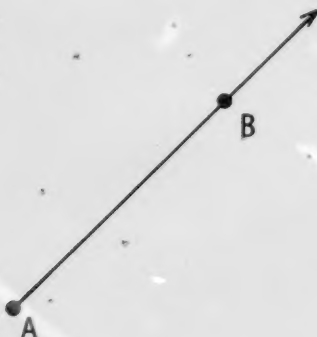
Name this ray. _____

Name this right angle. _____

Draw another right angle using $\overrightarrow{AB}$ and its endpoint A.

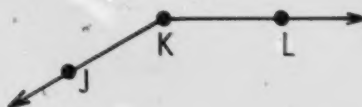
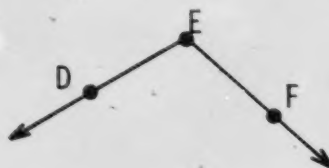
Name this angle. _____

What kind of curve did you form with the two rays you drew? _____



Right Angles

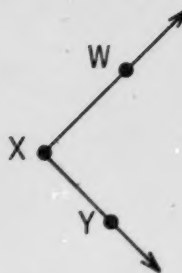
7. Test these angles to find the right angles.



_____ and _____ are right angles.

_____ is congruent to _____.

8. Use your angle to test if $\angle RST$ and $\angle WXY$ are right angles.



Is $\angle RST$ congruent to $\angle WXY$?

Yes

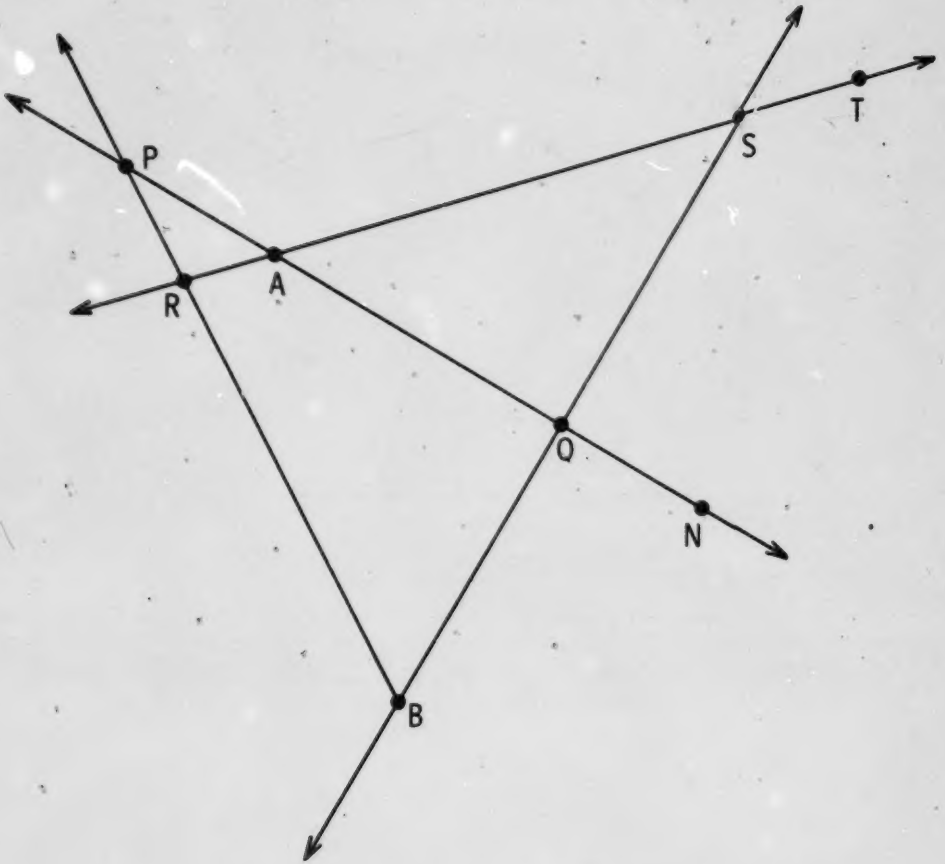
No

Do you think a right angle is always congruent to another right angle?

Yes

No

Review



Closed Curves

Mark an X on each closed curve.



Simple Closed Curves

1. Mark an X on each simple closed curve.



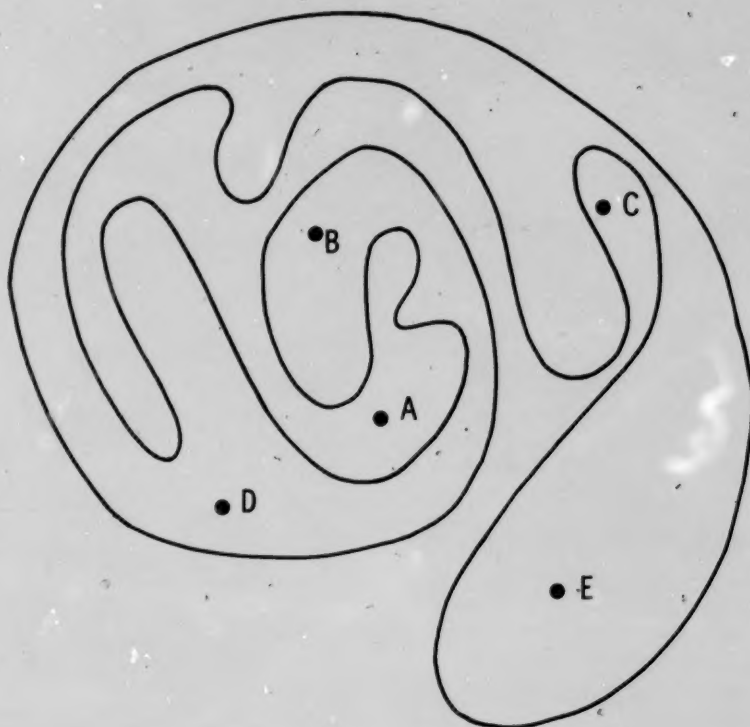
2. Draw a closed curve which is not simple.

Mark a point where this curve crosses itself.

Color a simple closed curve that is a subset of your curve.

Simple Closed Curves

3.



Is the curve a simple closed curve? Yes No

Look at points A, B, C, D, E.

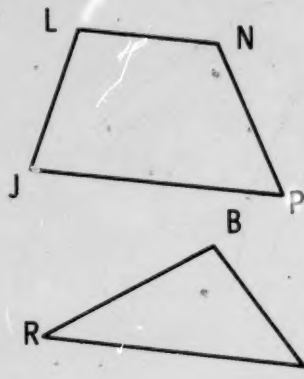
Write names of points which are inside the curve. _____

Write names of points which are outside the curve. _____

Polygons

1. Here are pictures of different polygons.

Use your pencil to connect each polygon with its name.



Triangle

Quadrilateral

Name three line segments on the triangle. _____

Name each vertex of the triangle. _____

Name the sides of the quadrilateral. _____

Name each vertex of the quadrilateral. _____

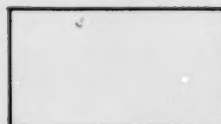
2. Two quadrilaterals are shown below.

Connect them with their special names.

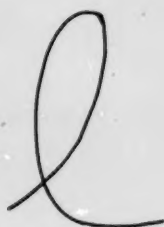
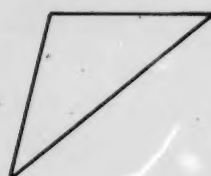


Square

Rectangle

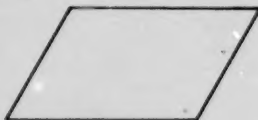


Review



Congruence of Polygons

1. These simple closed curves are unions of line segments.



These kinds of curves are called _____.

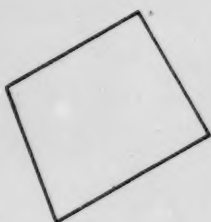
Can any of these polygons fit on each other exactly? Yes No

Do you think polygons can be congruent when
they do not have the same number of sides? Yes No

2. Two quadrilaterals are shown here.

Make a tracing of one curve.

Test to see if the sides and angles of the tracing fit exactly
on the sides and angles of the other curve.



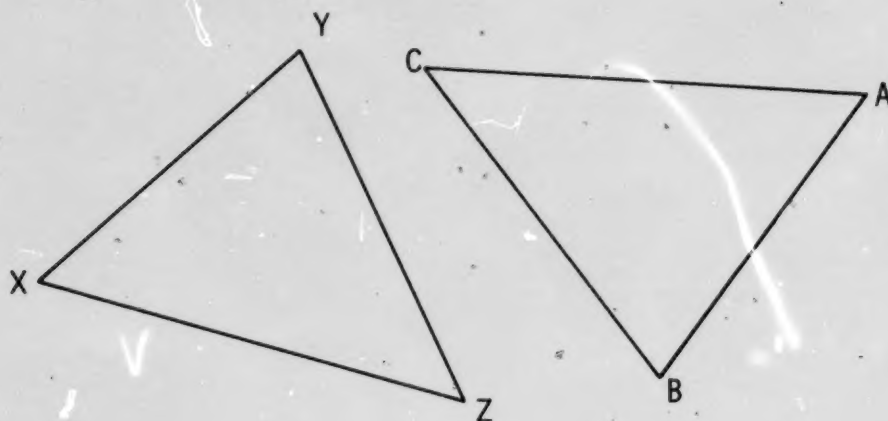
Do the sides fit exactly? Yes No

Do the angles fit exactly? Yes No

Are the curves congruent? Yes No

Congruence of Polygons

3. These triangles are named $\triangle XYZ$ and $\triangle ABC$.



Do you think the triangles are congruent? Yes No

Make a tracing of $\triangle XYZ$.

Mark the points X, Y, Z on the tracing.

Can you fit the tracing of $\triangle XYZ$ on $\triangle ABC$ without turning it? Yes No

If you turn the tracing, can it fit on $\triangle ABC$? Yes No

Line segment $\overline{XY}$ is congruent to _____.

Line segment $\overline{YZ}$ is congruent to _____.

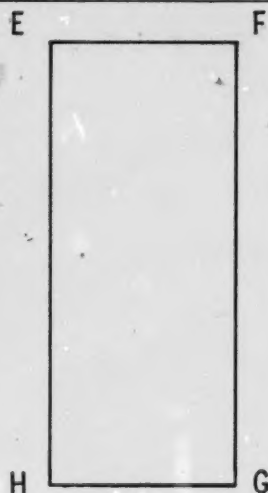
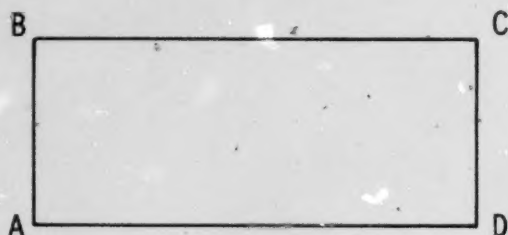
Line segment $\overline{XZ}$ is congruent to _____.

Is $\triangle XYZ$ congruent to $\triangle ABC$? Yes No

Congruence of Polygons

4. Here are two rectangles.

We will call one rectangle ABCD.

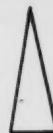
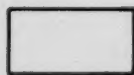


Make a tracing of ABCD.

Test to see if the tracing fits exactly on EFGH.

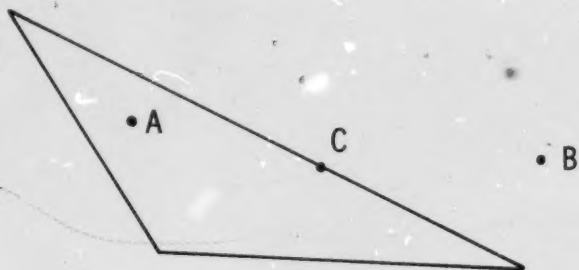
Do the line segments fit exactly?	Yes	No
Do you need to test the angles for congruence?	Yes	No
Is ABCD congruent to EFGH?	Yes	No

5. Put a cross in the two congruent figures in each row.



Inside, On, and Outside

1. A polygon with three sides is called a triangle.

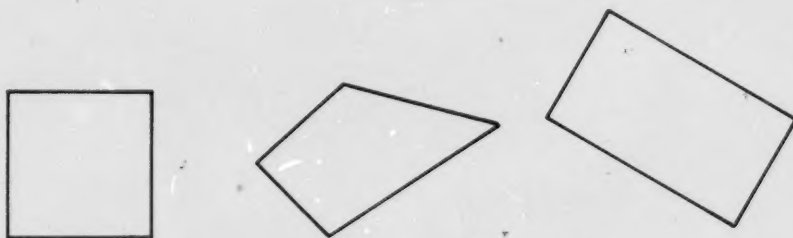


Name a point inside the triangle. _____

Name a point on the triangle. _____

Name a point outside the triangle. _____

2. Polygons with four sides are called quadrilaterals.



Write 1 in the rectangle that is not a square.

Write 2 inside the square.

Write 3 just outside each quadrilateral.

Mark X on each rectangle.

Interior and Exterior

1.

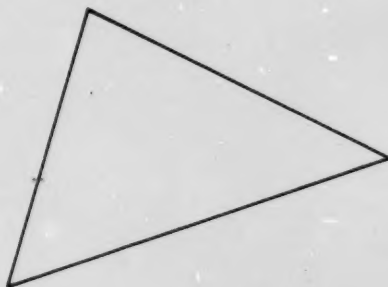


Mark a point J in the interior of this curve.

Mark a point C on the curve.

Mark a point D in the exterior of the curve.

2. Here is a triangle.



Color the triangle, but not its interior.

Color the interior using another color.

Interior and Exterior

3. Name two points in the interior of this figure. _____

Name two points in the exterior of this figure. _____



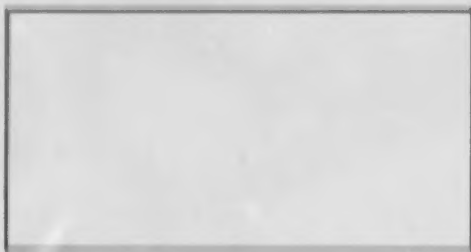
Without crossing the figure, can you draw a curve

from A to B?	Yes	No
from A to C?	Yes	No
from A to D?	Yes	No
from B to C?	Yes	No
from B to D?	Yes	No
from C to D?	Yes	No

Can any curve in a plane pass from the interior of a simple closed curve to its exterior without crossing the curve? Yes No

Regions

1. Here is a rectangle.



Color the curve.

Color the interior using a different color.

When we think of a curve and its interior, we call the figure a region.

2. Below are several regions and names for regions.

Regions will be shaded in this book.

Pair each region with its correct name.



Quadrilateral region



Circular region



Triangular region

Regions

3. Draw a triangle.

Color the triangle yellow.

Color the interior of the triangle red.

The region shown is a triangular region.

4. Draw $\overline{AD}$, $\overline{DB}$, $\overline{CB}$, and $\overline{AC}$.

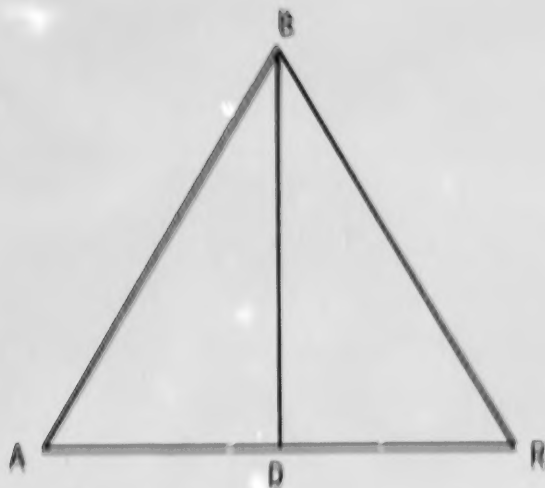


Underline the correct names for the figure you drew.

- (1) a simple closed curve
- (2) a polygon
- (3) a triangle
- (4) a quadrilateral
- (5) a quadrilateral region

Right Triangles

Here are triangle ABR and line segment $\overline{BD}$.



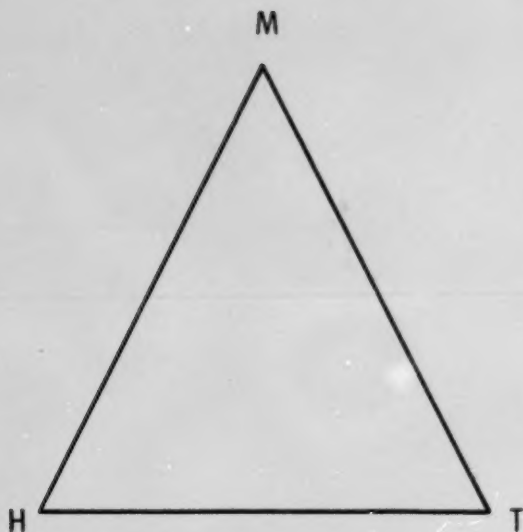
Are $\angle BDA$ and $\angle BDR$ congruent? Yes No

Are $\angle BDA$ and $\angle BDR$ right angles? Yes No

Name two right triangles. _____

Are these right triangles congruent? Yes No

Isosceles Triangles



1. Is $\overline{HM}$ congruent to $\overline{MT}$? Yes No
How many congruent sides does $\triangle HMT$ have? _____
Is $\triangle HMT$ an isosceles triangle? Yes No

2. Make a tracing of $\triangle HMT$.
Fold it so that the tracings of $\overline{MH}$ and $\overline{MT}$ fit on each other.
Is $\angle MHT$ congruent to $\angle MTH$? Yes No
How many congruent angles does $\triangle HMT$ have? _____

3. An isosceles triangle has _____ congruent sides and
_____ congruent angles.

Equilateral Triangles



Mark off $\overline{RS}$ on the edge of a sheet of paper.

Is your copy of $\overline{RS}$ congruent to $\overline{RT}$? Yes No

Is $\triangle RST$ an isosceles triangle? Yes No

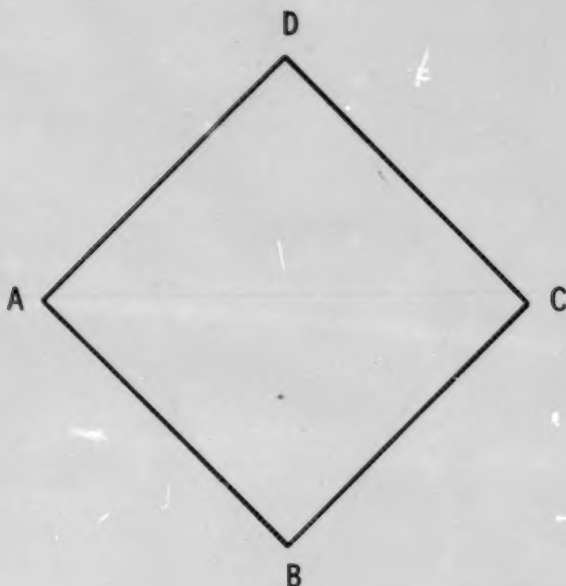
Is your copy of $\overline{RS}$ also congruent to $\overline{ST}$? Yes No

Are the three sides of this triangle congruent? Yes No

The special kind of isosceles triangle with all three sides congruent is called an equilateral triangle.

Is an equilateral triangle always an isosceles triangle? Yes No

Review



1. Figure ABCD is a square.

Draw $\overline{AC}$.

Name the two triangles you see. _____

Is $\triangle ACD$ an isosceles triangle? Yes No

Name its congruent sides. _____ and _____

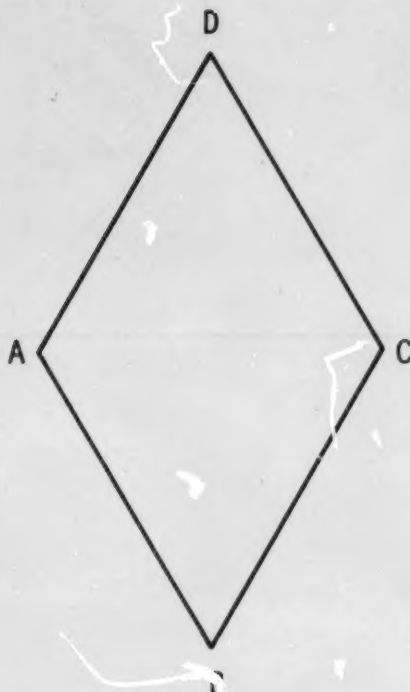
Is $\triangle ACD$ a right triangle? Yes No

Is $\triangle ACD$ an isosceles right triangle? Yes No

Is $\triangle ACD$ an equilateral triangle? Yes No

Do you think $\triangle ACD$ and $\triangle ACB$ are congruent? Yes No

Review



2. Look at quadrilateral ABCD.

Draw $\overline{AC}$.

Is $\triangle ACD$ isosceles?

Yes No

Is $\triangle ACD$ a right triangle?

Yes No

Is $\triangle ACD$ equilateral?

Yes No

Is $\triangle ACB$ equilateral?

Yes No

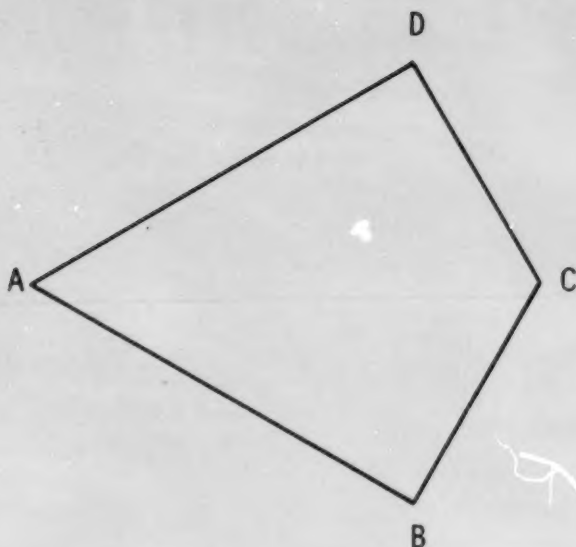
Are $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, and $\overline{DA}$ congruent?

Yes No

Is ABCD a square?

Yes No

Review



3. Look at quadrilateral ABCD.

Is $\angle ADC$ a right angle?	Yes	No
--------------------------------	-----	----

Is $\angle ABC$ a right angle?	Yes	No
--------------------------------	-----	----

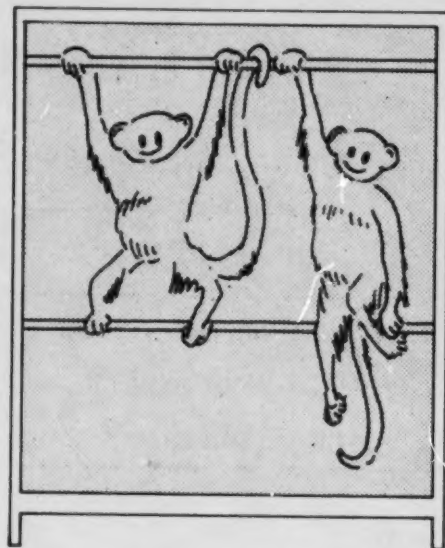
4. Draw AC above.

Is $\triangle ADC$ a right triangle?	Yes	No
--------------------------------------	-----	----

Is $\triangle ADC$ isosceles?	Yes	No
-------------------------------	-----	----

Is $\triangle ADC$ congruent to $\triangle ABC$?	Yes	No
---	-----	----

the . *PET SHOP*



Subsets

GIRL	APPLE	GREEN	BANANA
BLUE	GRAPE	BABY	PURPLE
GRASS	BOOK	PLATE	BLACK

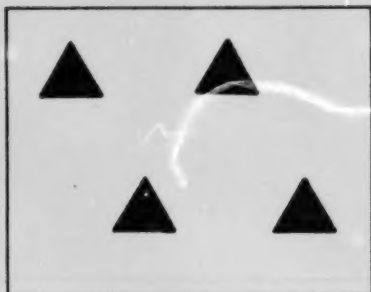
Set A

1. The words in the box that begin with a are a subset of Set A.
List the members of this subset. _____
2. The words that begin with b are also a subset of Set A.
List the members of this subset. _____

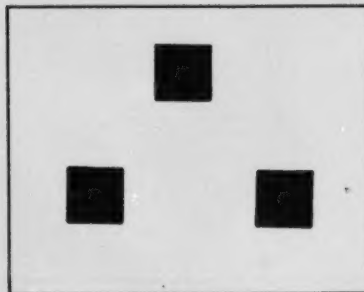
3. Ring the words that begin with p. How many members in this subset? _____
4. Describe the subset whose members are words that begin with z.

5. Ring the words that begin with gr. How many members in this subset? _____
List the members. _____

Union of Sets



Set A

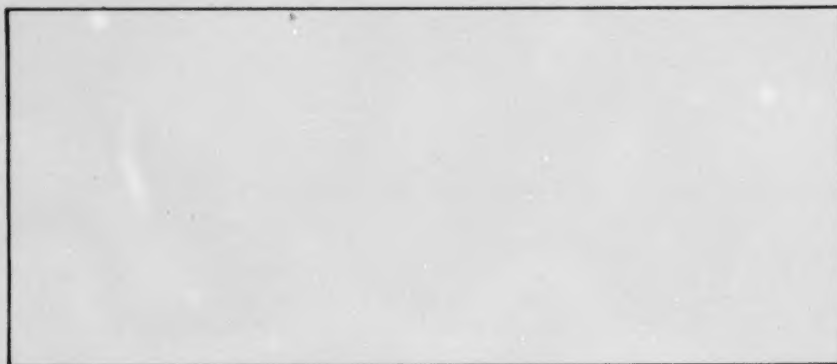


Set B

1. How many members are in Set A? _____
2. How many members are in Set B? _____
3. Think of joining Set A and Set B.

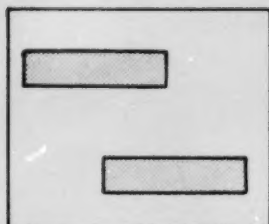
When we join two sets we have a new set called the union of the two sets.

Draw a picture for the union of sets A and B.



4. How many members are in the union of sets A and B? _____
5. Write an equation for the two sets and their union. _____

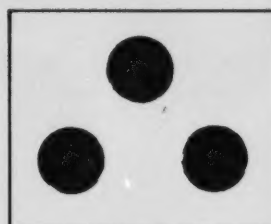
Union of Sets



Set X

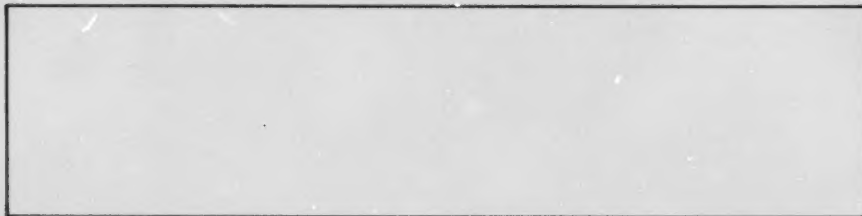


Set Y



Set Z

6. How many members are in Set X? _____
7. How many members are in Set Y? _____
8. Draw a picture for the union of sets X and Y.



9. Write an equation for X and Y and their union.

10. How many members are in Set Z? _____

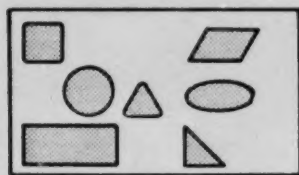
11. Draw a picture for the union of sets Y and Z.



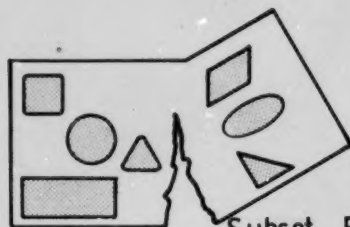
12. Write an equation for Y and Z and their union.

Removing a Subset

1. Look at these pictures.



Set A

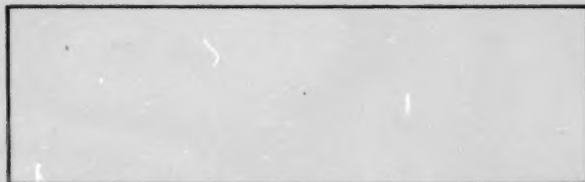


Subset B

How many members are in Set A? _____

2. How many members are in the subset being removed? _____

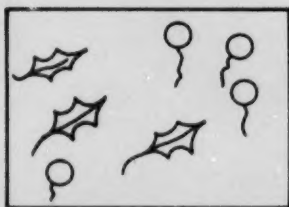
3. Draw a picture of the set that would be left when Subset B is removed from Set A.



4. How many members are in the set remaining when Subset B is removed from Set A? _____

5. Write an equation which describes the set remaining. _____

6. Look at these pictures. Ring a subset in each picture and write an equation for the set remaining.



A	B	C
D	E	F
G	H	I

Jane	Bob
Sally	Mary
Joe	Ann
Bill	Charles

Union of Sets

1. Set A = {lamb, pig, dog}

Set B = {cow, cat}

Ring the set that is the union of sets A and B.

{lamb, horse, pig, dog, cat}

{lamb, pig, dog, cat, goat}

{lamb, pig, dog, cat, cow}

{cow, cat, lamb, dog, fish}

2. Set C = {book, pencil, eraser, crayon}

Set D = {clip, tape, ruler}

Ring the set that is the union of sets C and D.

{crayon, ruler, pencil, eraser, tape}

{clip, ruler, book, crayon, pencil, eraser, tape}

{tape, ruler, book, pencil, eraser, crayon, chalk}

3. Set E = {rubber, tin, doll}

Set F = {ball, kite, bat, car}

Set G is the union of sets E and F.

Ring set G.

{rubber, tin, ball, car, doll, car, kite}

{car, rubber, tin, doll, ball, kite, cap}

{kite, doll, ball, rubber, tin, car, bat}

Removing a Subset

1. Set $R = \{\text{dress, hat, sock, shoe, coat}\}$

Set T is a subset of Set R .

Set $T = \{\text{shoe, sock}\}$

Ring the set remaining when Set T is removed from Set R .

$\{\text{sock, shoe}\}$

$\{\text{coat, hat, dress}\}$

$\{\text{hat, shoe, coat}\}$

2. Set $V = \{\text{doll, wagon, ball, house, crayon}\}$

Set $W = \{\text{ball, crayon}\}$

Ring the set remaining when Set W is removed from Set V .

$\{\text{house, dog, cat, ball}\}$

$\{\text{crayon, ball}\}$

$\{\text{wagon, doll, house}\}$

3. Set $F = \{0, 1, 2, 3, 4, 5, 6\}$

Set $G = \{6, 4, 2, 0\}$

Ring the set remaining when Set G is removed from Set F .

$\{3\}$

$\{2, 3, 4, 7\}$

$\{5, 1, 3\}$

4. Set $H = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$

Set K is the set of numbers less than 5.

List the members of Set K . _____

Ring the set remaining when Set K is removed from Set H .

$\{5, 6, 7, 8\}$

$\{6, 7, 8\}$

$\{0, 1, 2, 3, 4\}$

5. Set $P = \{11, 12, 13, 14, 15\}$

Set X is the set of numbers less than 12 in set P .

List the members of Set X . _____

Ring the set remaining when Set X is removed from Set P .

$\{12, 13, 14, 15\}$

$\{13, 14, 15\}$

$\{14, 15\}$

6. Set $M = \{20, 21, 22, 23, 24, 25\}$

Set H is the set of numbers greater than 23 in set M .

List the members of Set H .

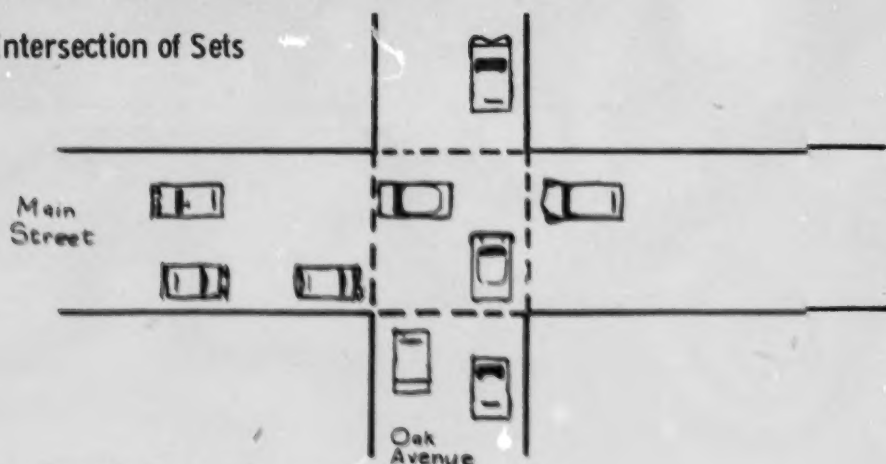
Ring the set remaining when Set H is removed from Set M .

$\{20, 21, 22, 23\}$

$\{24, 25\}$

$\{20, 21, 22\}$

Intersection of Sets



1. Use the picture to answer these questions.

How many cars are on Main Street but not on Oak Avenue? _____
Color each of these cars red.

How many cars are on Oak Avenue but not on Main Street? _____
Color each of these cars green.

How many cars are on Main Street and on Oak Avenue
at the same time? _____
Color each of these cars blue.

Total number of cars in the picture: _____

Total number of cars on Main Street: _____

Total number of cars on Oak Avenue: _____

Number of cars in the intersection of Main Street
and Oak Avenue: _____

Explain each of these sentences in relation to the picture:

$$4 + 3 + 2 = 9$$

$$6 + 5 = 11, \quad \text{and} \quad 11 - 2 = 9.$$

2. Here is a picture of a set of girls:



How many girls are in each of these subsets:

The set of girls with bows and jump-ropes. _____

The set of girls with bows but without jump-ropes. _____

The set of girls with jump-ropes but without bows. _____

Are each two of these three sets disjoint? _____

Write an equation for the number of girls all together using the numbers of girls in the three subsets:

Draw a ring around each of these sets:

The set of girls with bows. This set has _____ members.

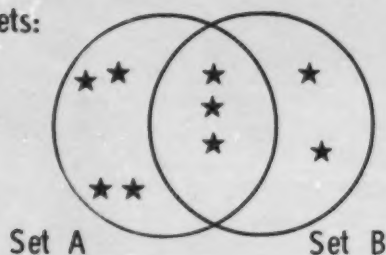
The set of girls with jump-ropes. This set has _____ members.

Are these two sets disjoint? _____

How many members are in the intersection of these two sets? _____

Write an equation for the picture. _____

3. Here are some sets:



Are sets A and B disjoint sets? _____

How can you tell? _____

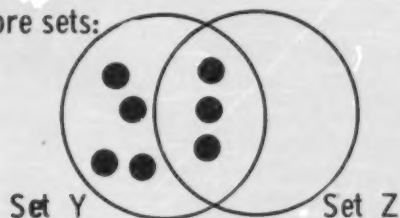
How many members are there in set A? _____

How many members are there in set B? _____

How many members are there in the intersection of set A and set B? _____

How many members are there in the union of set A and set B? _____

4. Here are some more sets:



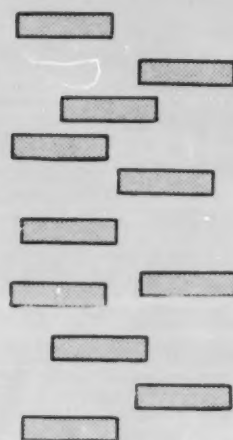
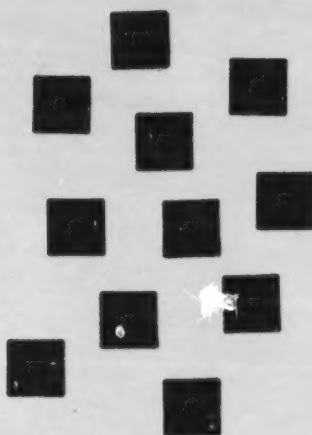
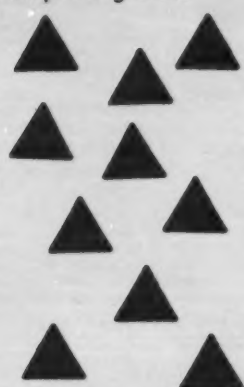
How many members in Set Y? _____

How many members in the intersection of sets Y and Z? _____

There are 12 members in the union of sets Y and Z. _____

How many members in set Z? _____

Comparing Sets



- 1) There are more squares than _____.
Show by pairing that your answer is correct.
- 2) There are as many _____ as _____.
Show by pairing that your answer is correct.
- 3) Is the set of  's equivalent to the set of  's? _____
How do you know? _____
- 4) How many members in the set of  's? _____
- 5) How many members in the set of  's? _____



- 6) How does the number line help you remember that:
 - (a) 11 is greater than 10? _____
 - (b) 8 is less than 10? _____

Comparing Numbers

Write either $<$ or $>$ between each pair of numerals:

Remember:

$7 < 9$ is read

$9 > 5$ is read

"7 is less than 9"

"9 is greater than 5"

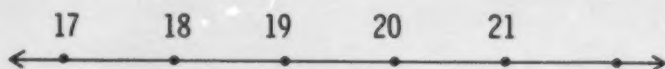
9	15
15	19
8	6
21	17
35	31
47	52
28	21
75	80
3	7
53	55

18	16
45	51
81	35
23	8
17	25
38	49
67	62
11	29
14	31
29	43

23	32
72	67
89	73
76	84
43	25
28	39
17	37
39	26
62	47
99	102

Using the Number Line

The set of whole numbers greater than 17 but less than 21 is {18, 19, 20}.



1. The set of whole numbers greater than 29 but less than 32 is { }.



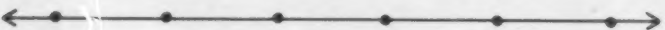
2. The set of whole numbers greater than 36 but less than 41 is { }.



3. The set of whole numbers greater than 52 but less than 55 is { }.



4. The set of whole numbers greater than 92 but less than 98 is { }.



Intersection of Sets of Numbers

1. Set A is the set of whole numbers greater than 12 but less than 18.

Set A = {13, 14, 15, 16, 17}

Set B is the set of whole numbers greater than 9 but less than 16.

Set B = {10, 11, 12, 13, 14, 15}

The members in the intersection of sets A and B are:

{ }

2. Set R is the set of whole numbers greater than 50 but less than 54.

Set R = { }

Set T is the set of whole numbers greater than 48 but less than 53.

Set T = { }

The members in the intersection of sets R and T are:

{ }

3. Set F is the set of whole numbers greater than 47 but less than 53.

Set F = { }

Set G is the set of whole numbers greater than 50 but less than 57.

Set G = { }

The members in the intersection of sets F and G are:

{ }

4. Set X is the set of whole numbers greater than 79 but less than 85.

Set X = { }

Set Y is the set of whole numbers greater than 82 but less than 90.

Set Y = { }

The members in the intersection of sets X and Y are:

{ }

Addition Chart

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Relating Subtraction to Addition

Fill in the blank. Then write the associated addition fact.

Example: $10 - 4 = \underline{6}$

$6 + 4 = 10$

1. $13 - 7 = \underline{\quad\quad}$

6. $15 - 8 = \underline{\quad\quad}$

2. $11 - 6 = \underline{\quad\quad}$

7. $14 - 9 = \underline{\quad\quad}$

3. $16 - 8 = \underline{\quad\quad}$

8. $12 - 5 = \underline{\quad\quad}$

4. $14 - 6 = \underline{\quad\quad}$

9. $13 - 8 = \underline{\quad\quad}$

5. $17 - 9 = \underline{\quad\quad}$

10. $16 - 7 = \underline{\quad\quad}$

Relating Addition to Subtraction

Complete. Then rewrite each addition fact as a subtraction fact.

$$9 + \underline{\quad} = 17$$

$$17 - 8 = 9$$

1. $4 + \underline{\quad} = 12$

7. $6 + \underline{\quad} = 14$

2. $7 + \underline{\quad} = 13$

8. $9 + \underline{\quad} = 15$

3. $7 + \underline{\quad} = 11$

9. $6 + \underline{\quad} = 11$

4. $8 + \underline{\quad} = 15$

10. $5 + \underline{\quad} = 14$

5. $5 + \underline{\quad} = 12$

11. $4 + \underline{\quad} = 13$

6. $3 + \underline{\quad} = 12$

12. $9 + \underline{\quad} = 18$

Miscellaneous Exercises

Addition and Related Subtraction

10	
$4 + 6 =$	_____
$6 + 4 =$	_____
$10 - 6 =$	_____
$10 - 4 =$	_____

10	
$2 + 8 =$	_____
$8 +$	_____ = _____
$10 -$	_____ = _____
$10 -$	_____ = _____

10	
$3 + 7 =$	_____
$7 +$	_____ = _____
$10 - 3 =$	_____
$10 -$	_____ = _____

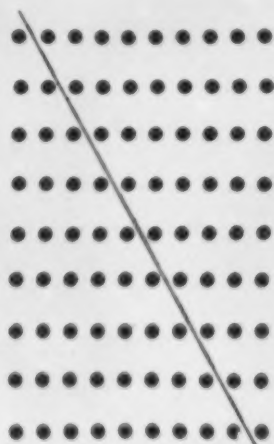
10	
$9 + 1 =$	_____
$1 +$	_____ = _____
$10 - 1 =$	_____
$10 -$	_____ = _____

9	
$7 + 2 =$	_____
$2 +$	_____ = _____
$9 - 2 =$	_____
$9 -$	_____ = _____

9	
$5 +$	_____ = _____
$4 +$	_____ = _____
$9 -$	_____ = _____
$9 -$	_____ = _____

Partitions of a Set of Ten Things

Write an equation for each row.



$$10 = 1 + \underline{\hspace{2cm}}$$

$$10 = 2 + \underline{\hspace{2cm}}$$

$$10 = 3 + \underline{\hspace{2cm}}$$

$$10 = 4 + \underline{\hspace{2cm}}$$

$$10 = 5 + \underline{\hspace{2cm}}$$

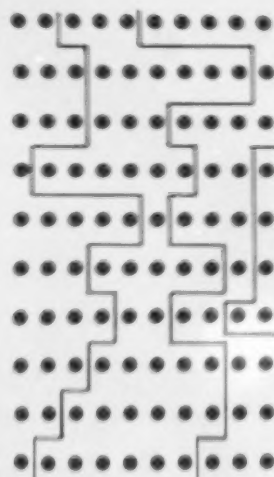
$$10 = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$10 = \underline{\hspace{2cm}} + 3$$

$$10 = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

$$10 = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

Write an equation for each row.



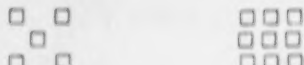
$$2 + 3 + 5 = 10$$

$$3 + 5 + 1 = 10$$

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Using a Ten in Addition and Subtraction

Join some of the members of the second set to the first set to make a group of ten.

 6  8 +  10 + 4 6 + 8 = 10 + 4 6 + 8 = _____	 5  9 +  10 + 4 5 + 9 = _____ 5 + 9 = _____
 7  7 +  10 + 4 _____ = _____ 7 + 7 = _____	FINISH: 9 + 1 + 4 = 14 8 + 2 + 4 = 14 7 + 3 + 4 = 14 6 + _____ + _____ = 14 _____ + 5 + _____ = 14 4 + _____ + 4 = 14 3 + _____ + _____ = 14 2 + _____ + _____ = 14 1 + _____ + _____ = 14

Using a Ten in Addition and Subtraction

Think of the sum of the two numbers as 10 and some ones.

$$6 + 7 = 10 + 3$$

$$9 + 5 = \underline{\hspace{2cm}}$$

$$7 + 4 = 10 + 1$$

$$8 + 6 = \underline{\hspace{2cm}}$$

$$9 + 6 = 10 + \underline{\hspace{2cm}}$$

$$5 + 6 = \underline{\hspace{2cm}}$$

$$8 + 5 = 10 + \underline{\hspace{2cm}}$$

$$4 + 8 = \underline{\hspace{2cm}}$$

$$9 + 2 = \underline{\hspace{2cm}}$$

$$8 + 8 = \underline{\hspace{2cm}}$$

$$8 + 4 = \underline{\hspace{2cm}}$$

$$7 + 5 = \underline{\hspace{2cm}}$$

$$5 + 9 = \underline{\hspace{2cm}}$$

$$8 + 3 = \underline{\hspace{2cm}}$$

$$6 + 8 = \underline{\hspace{2cm}}$$

$$7 + 6 = \underline{\hspace{2cm}}$$

$$9 + 4 = \underline{\hspace{2cm}}$$

$$9 + 3 = \underline{\hspace{2cm}}$$

$$5 + 8 = \underline{\hspace{2cm}}$$

$$4 + 7 = \underline{\hspace{2cm}}$$

$$6 + 5 = \underline{\hspace{2cm}}$$

$$9 + 9 = \underline{\hspace{2cm}}$$

$$8 + 9 = \underline{\hspace{2cm}}$$

$$7 + 7 = \underline{\hspace{2cm}}$$

Pairs of Numbers

Complete this chart.

Number Pair		Operation	Whole number sum or difference
First number	Second number		
7	4	+	11
12	3	-	9
6	10	-	Not any
5	8	+	
15	9	-	
8	7	+	
7	14	-	
16	8	-	
5	9		14
9	5		4
5	9		Not any
6		+	6
	12		0

Miscellaneous Exercises

Write two addends for each sum. Then change the order of the addends. Use numbers less than 10.

11
9, 2
2, 9
8, 3
3, 8

12

13

14

15

16

17

18

Miscellaneous Exercises

The sum of two numbers is named in each larger box. Below each sum is one of the addends. Name the other addend. The first one is done for you.

12	
5	7
8	
4	

11	
3	
9	
7	

13	
6	
9	
7	

14	
9	
8	
6	

13	
5	
7	
4	

16	
7	
8	
9	

12	
10	
9	
7	

15	
9	
8	
4	

Miscellaneous Exercises

Finish each equation.

$$8 + 7 =$$

$$15 + 7 =$$

$$6 + 9 =$$

$$15 + 9 =$$

$$9 + 8 =$$

$$17 + 8 =$$

$$7 + 9 =$$

$$16 - 9 =$$

$$5 + \quad = 13$$

$$8 + \quad = 13$$

$$+ 7 = 12$$

$$+ 5 = 12$$

$$8 + 8 =$$

$$16 - 8 =$$

$$9 + 5 =$$

$$14 - 5 =$$

$$6 + 8 =$$

$$14 - 8 =$$

$$8 + 6 =$$

$$14 - 6 =$$

$$5 + \quad = 14$$

$$9 + \quad = 14$$

$$+ 9 = 17$$

$$+ 8 = 17$$

Miscellaneous Exercises

Fill in the blanks so that in each row the sum of the first two numbers is the third number

and

in each column the sum of the first two numbers is the third number.

(4)	2	6
0	3	3
4	5	9

	3	4
6		
7		10

5		
2		4
	5	12

4		4
4	5	
8		13

3		8
2		
	6	11

	4	7
	2	
8		14

Miscellaneous Exercises

Fill in the charts by finding the sum of pairs of numbers.

	2	7	6	8
5	7			
9	11			
3			9	
4				

	7	5	9	8
6				
0				
8				
5				

	4	6	7	9
5				
1				
6				
7				

	8	6	9	5
8				
5				
7				
6				

Miscellaneous Exercises

Make these sentences true by using
=, <, or >.

1. $7 + 6$ _____ $6 + 7$
2. $5 + 8$ _____ $5 + 9$
3. $9 + 3$ _____ $2 + 9$
4. $6 + 3$ _____ $9 + 1$
5. $6 + 5$ _____ $5 + 6$
6. $2 + 9$ _____ $9 + 2$
7. $7 + 3$ _____ $4 + 7$
8. $6 + 6$ _____ $6 + 5$
9. $2 + 7$ _____ $3 + 7$
10. $4 + 8$ _____ $8 + 4$
11. $6 + 2$ _____ $2 + 6$
12. $2 + 9$ _____ $8 + 3$
13. $5 + 8$ _____ $8 + 5$
14. $4 + 8$ _____ $6 + 5$
15. $3 + 9$ _____ $9 + 3$
16. $6 + 4$ _____ $7 + 3$

Make these true by using + and
-.

1. 4 ___ 2 > 7 ___ 5
2. 9 ___ 7 < 8 ___ 4
3. 8 ___ 2 < 7 ___ 2
4. 7 ___ 7 > 8 ___ 2
5. 8 ___ 9 < 9 ___ 9
6. 9 ___ 4 > 7 ___ 6
7. 14 ___ 3 > 8 ___ 4
8. 9 ___ 8 < 6 ___ 4
9. 17 ___ 2 > 8 ___ 4
10. 21 ___ 6 < 9 ___ 8
11. 28 ___ 4 > 15 ___ 8
12. 34 ___ 7 < 25 ___ 15
13. 79 ___ 24 > 149 ___ 57
14. 56 ___ 29 < 12 ___ 14
15. 89 ___ 45 > 134 ___ 51
16. 201 ___ 98 > 300 ___ 56

Miscellaneous Exercises

Fill in the blanks with the correct numerals.

Begin at the left and go clockwise.

$$\begin{array}{r} 7 + (9) = \\ + 8 = \end{array} \bigcirc 16 \begin{array}{r} - 9 = \\ - 7 = \end{array}$$

$$\begin{array}{r} 8 + = \\ 5 + = \end{array} \bigcirc 15 \begin{array}{r} - 3 = \\ - 6 = \end{array}$$

$$\begin{array}{r} 4 + = \\ 2 + = \end{array} \bigcirc 11 \begin{array}{r} - 8 = \\ - 7 = \end{array}$$

$$\begin{array}{r} 6 + = \\ 8 + = \end{array} \bigcirc 12 \begin{array}{r} - 7 = \\ - 9 = \end{array}$$

$$\begin{array}{r} 8 + = \\ 5 + = \end{array} \bigcirc 14 \begin{array}{r} - 8 = \\ - 5 = \end{array}$$

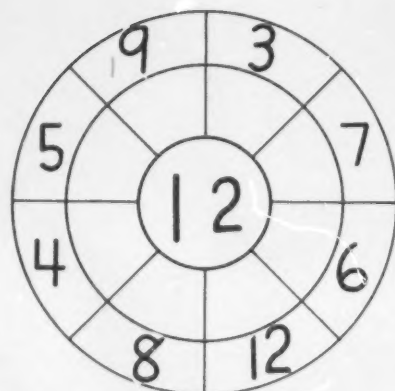
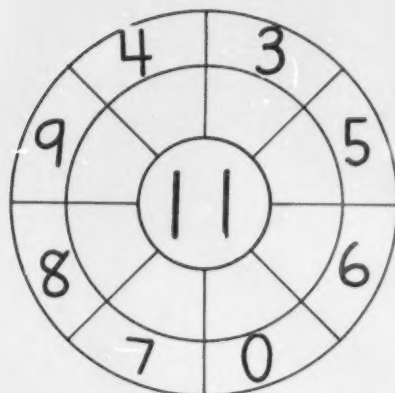
$$\begin{array}{r} 6 + = \\ 5 + = \end{array} \bigcirc 13 \begin{array}{r} - 7 = \\ - 7 = \end{array}$$

Miscellaneous Exercises

Fill in the second ring.

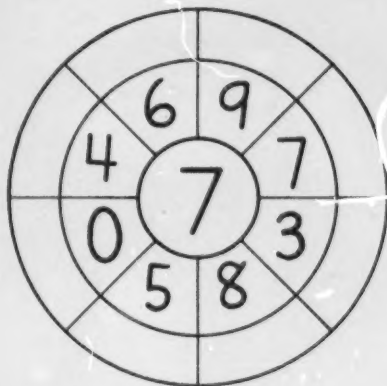
Given addend plus other addend equals the sum named in the third ring. Example: $2 + n = 13$

$n = ?$



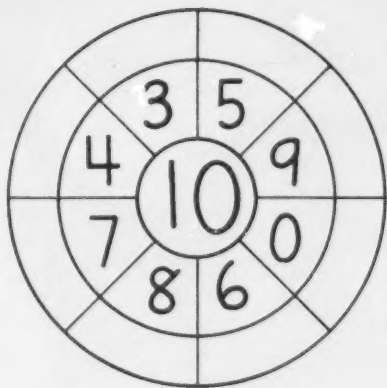
Miscellaneous Exercises

1. Find the sum by adding the number named in the center ring to a number named in the second ring. Write the sum in the outer ring.



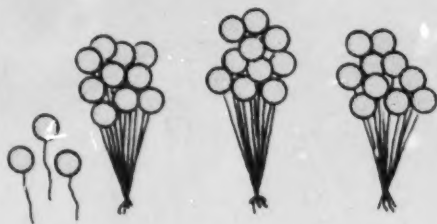
2. Find the difference by subtracting a number named in the second ring from the number named in the center ring.

For example: $13 - 5 = 8$.

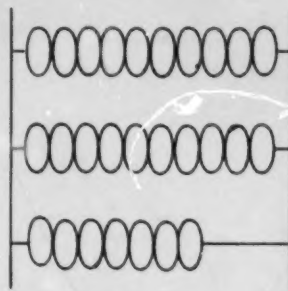


Tens and Ones

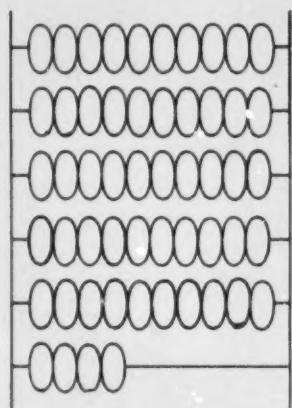
Fill in the blanks.



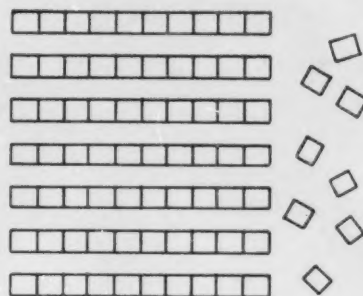
___ tens, ___ ones
or



___ tens, ___ ones
or



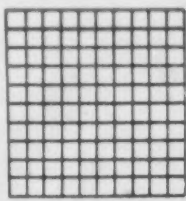
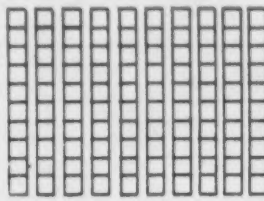
___ tens, ___ ones
or



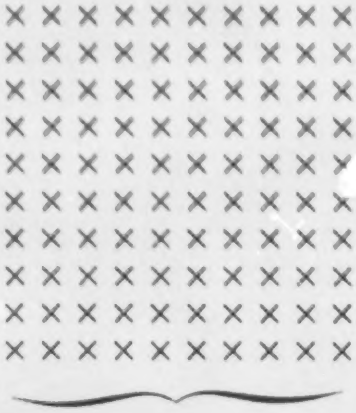
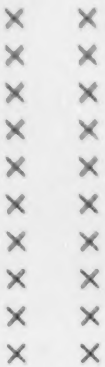
___ tens, ___ ones
or

Hundreds, Tens, and Ones

Complete each of these.

 1 one hundred	 10 tens	 1 ten	 10 ones
186: ___ hundred, ___ tens, and ___ ones 342: ___ hundreds, ___ tens, and ___ ones 203: ___ hundreds, ___ tens, and ___ ones 230: ___ hundreds, ___ tens, and ___ ones ___: 6 hundreds, 2 tens, and 5 ones ___: 4 hundreds, 9 tens, and 6 ones ___: 7 hundreds, 0 tens, and 4 ones ___: 5 hundreds, 4 tens, and 1 one			

Hundreds, Tens, and Ones

					
124 =	100	+	20	+	4

Fill in the blanks:

563 =	500	+	60	+	3
247 =	_____				
486 =	_____				
625 =	_____				
_____ =	700	+	40	+	1
_____ =	500	+	90	+	8
_____ =	400	+	60		
_____ =	800	+	2		

Hundreds, Tens, and Ones

Fill the blanks.

$$847 = \underline{800} + \underline{40} + \underline{7}$$

$$235 = \underline{\hspace{2cm}}$$

$$670 = \underline{\hspace{2cm}}$$

$$509 = \underline{\hspace{2cm}}$$

$$999 = \underline{\hspace{2cm}}$$

$$419 = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} = \underline{700} + \underline{4}$$

$$\underline{\hspace{2cm}} = \underline{20} + \underline{100} + \underline{8}$$

$$\underline{\hspace{2cm}} = \underline{6} + \underline{30} + \underline{800}$$

$$\underline{\hspace{2cm}} = \underline{200} + \underline{80}$$

$$\underline{\hspace{2cm}} = \underline{5} + \underline{600}$$

$$603 = \underline{\hspace{2cm}}$$

$$476 = \underline{\hspace{2cm}}$$

$$875 = \underline{\hspace{2cm}}$$

$$570 = \underline{\hspace{2cm}}$$

$$409 = \underline{\hspace{2cm}}$$

$$888 = \underline{\hspace{2cm}}$$

$$\underline{\hspace{2cm}} = \underline{800} + \underline{10}$$

$$\underline{\hspace{2cm}} = \underline{200} + \underline{30} + \underline{5}$$

$$\underline{\hspace{2cm}} = \underline{4} + \underline{600}$$

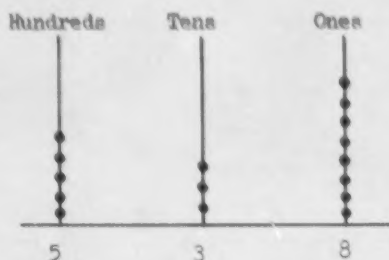
$$\underline{\hspace{2cm}} = \underline{80} + \underline{700}$$

$$\underline{\hspace{2cm}} = \underline{5} + \underline{200}$$

Place Value

An abacus can help us represent a number.

1.

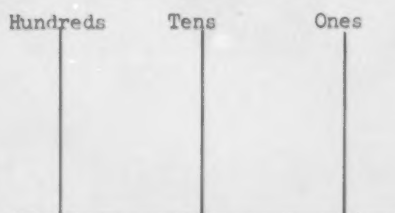


The number _____ is represented on this abacus.

_____ = 5 hundreds + 3 tens + 8 ones, or

_____ = 500 + 30 + 8.

2.



Show 472 on this abacus.

472 = _____ + _____ + _____

3.

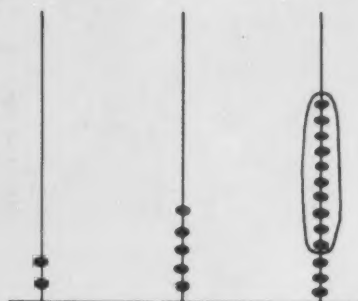


Show 817 on this abacus.

817 = _____ + _____ + _____

Renaming Numbers

1.

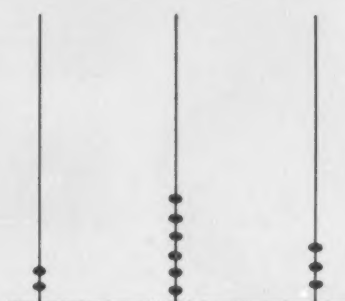


$$200 + 50 + 12 = 263$$

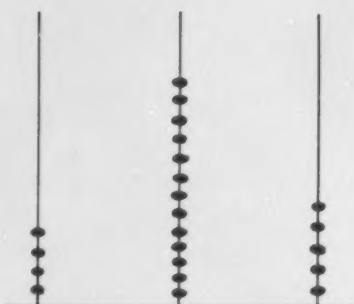
A set of ten _____ can be shown as

one _____.

$$200 + 60 + 3 = 263$$



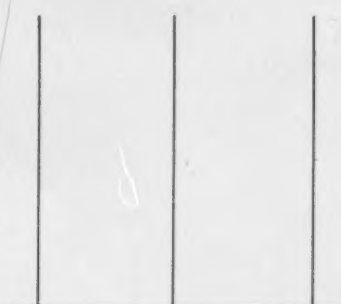
2.



$$400 + 130 + 5 = \underline{\hspace{2cm}}$$

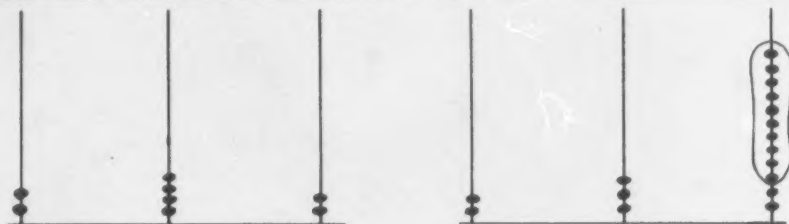
A set of ten _____ can be shown as

one _____.



Renaming Numbers

3.



$$200 + 40 + 2 = 242$$

Show one set of ten as a set of ten ones.

Write the new name. _____

4.



$$500 + 30 + 1 = 531$$

Show one hundred as a set of ten tens.

Write the new name. _____

5.

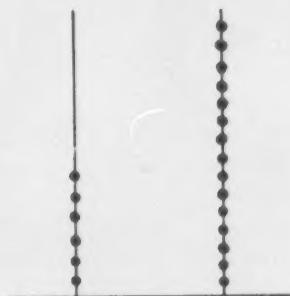
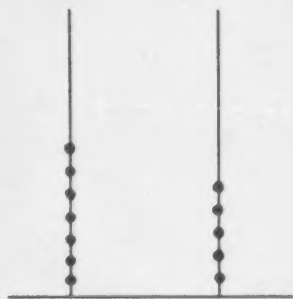


$$700 + 80 + 0 = 780$$

Show one set of ten as a set of ten ones.

Write the new name. _____

Different Ways of Thinking About a Number



$$75 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones} = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$68 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$94 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$39 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$62 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$49 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$57 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$84 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$71 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ one}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$96 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$74 = \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\text{or } \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

Naming a Number in Different Ways

Complete the following sentences.

357 = 3 hundreds + _____ tens + 7 ones,
or 3 hundreds + 4 tens + _____ ones,
or 2 hundreds + _____ tens + 17 ones.

268 = _____ hundreds + 6 tens + 8 ones,
or 2 hundreds + 5 tens + _____ ones,
or 1 hundred + _____ tens + 18 ones.

569 = _____ tens + 9 ones,
or 4 hundreds + _____ tens + 9 ones,
or _____ hundreds + 15 tens + 19 ones.

Write 426 in three other ways.

Write 752 in three other ways.

Renaming a Number

Match the expanded form with the standard form. For example,

(A) $100 + 40 + 3 = 143$, so A is placed in the blank beside 143.

A $100 + 40 + 3$

I $400 + 90 + 1$

B $500 + 70 + 12$

J $600 + 10 + 15$

C $600 + 160 + 4$

K $500 + 80 + 2$

D $900 + 20 + 2$

L $700 + 00 + 16$

E $300 + 00 + 7$

M $700 + 60 + 4$

F $600 + 110 + 6$

N $200 + 100 + 7$

G $100 + 30 + 13$

O $500 + 120 + 5$

H $200 + 10 + 17$

P $800 + 120 + 2$

764 _____

227 _____

582 B _____

491 _____

143 A _____

625 _____

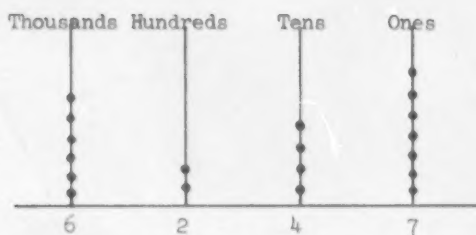
716 _____

922 _____

307 _____

Thousands

1.

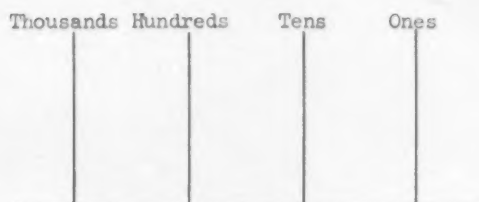


The number _____ is represented on this abacus.

_____ = 6 thousands + 2 hundreds + 4 tens + 7 ones

_____ = 6000 + 200 + 40 + 7

2. Show 3465 on this abacus.

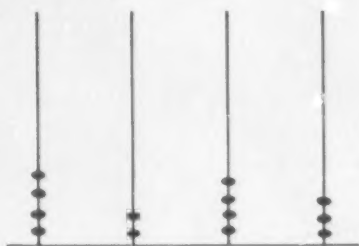


3465 = _____ thousands + _____ hundreds + _____ tens + _____ ones

3465 = _____ + _____ + _____ + _____

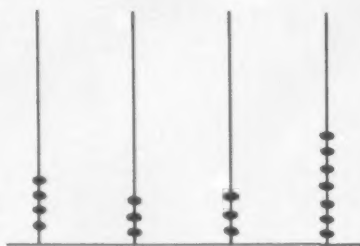
Renaming Numbers

1.



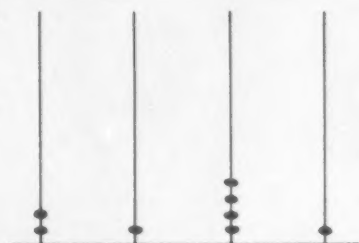
$$4000 + 200 + 40 + 3 =$$

2.



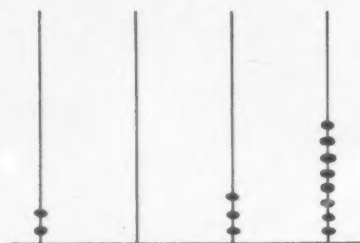
$$6000 + 300 + 30 + 7 =$$

3.



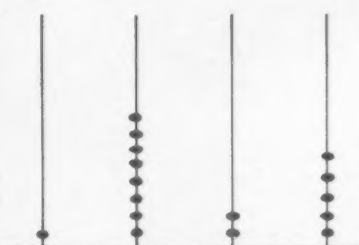
$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} =$$

4.



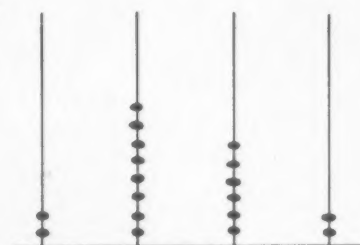
$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} =$$

5.



$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} =$$

6.



$$\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} =$$

Thousands

Complete each of these:

$$\underline{\quad} \text{ ones} = 1 \text{ ten}$$

$$\underline{\quad} \text{ tens} = 1 \text{ hundred}$$

$$\underline{\quad} \text{ hundreds} = 1 \text{ thousand}$$

$$2748 = \underline{\quad} \text{ thousands} + \underline{\quad} \text{ hundreds} + \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$5619 = \underline{\quad} \text{ thousands} + \underline{\quad} \text{ hundreds} + \underline{\quad} \text{ ten} + \underline{\quad} \text{ ones}$$

$$7546 = \underline{\quad} \text{ thousands} + \underline{\quad} \text{ hundreds} + \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones}$$

$$\underline{\quad} = 5 \text{ thousands} + 3 \text{ hundreds} + 8 \text{ tens} + 0 \text{ ones}$$

$$\underline{\quad} = 3 \text{ thousands} + 0 \text{ hundreds} + 7 \text{ tens} + 4 \text{ ones}$$

$$\underline{\quad} = 9 \text{ thousands} + 2 \text{ hundreds} + 0 \text{ tens} + 6 \text{ ones}$$

$$6324 = \underline{6000 + 300 + 20 + 4}$$

$$5289 = \underline{\quad + \quad + \quad}$$

$$9165 = \underline{\quad + \quad + \quad}$$

$$\underline{\quad} = 2000 + 900 + 10 + 2$$

$$\underline{\quad} = 7000 + 500 + 3$$

$$\underline{\quad} = 4000 + 80 + 7$$

Naming a Number in Different Ways

1. Show 6549 on the abacus with 6 thousands, 5 hundreds, 4 tens and 9 ones.



2. Show 6549 with only 5 thousands.



3. Show 6549 with only 3 tens.



4. Show 6549 with only 4 hundreds.



Naming a Number in Different Ways

1. Here are some ways to name 3547.

3547 ones

35 hundreds + 4 tens + 7 ones

3 thousands + 5 hundreds + 4 tens + 7 ones

354 tens + 7 ones

$3000 + 500 + 40 + 7$

$3500 + 40 + 7$

2. Show some ways to name 2356.

3. Show some ways to name 4253.

Names for Numbers

1. From the list below check (✓) all the ways of naming 6529.

- a) 6,529 ones
- b) 652 tens + nine ones
- c) $6000 + 500 + 10 + 9$
- d) $6000 + 1500 + 20 + 9$
- e) $5000 + 1500 + 20 + 9$
- f) 65 hundreds + 20 + 9
- g) $6000 + 400 + 20 + 9$
- h) $6000 + 500 + 20 + 19$

2. Answer Yes or No.

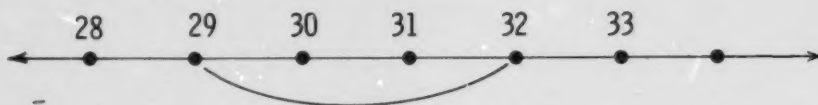
- a) 5,324 is 53 tens and 24 ones. _____
- b) $7381 = 600 + 120 + 8$. _____
- c) 32 hundreds + 2 tens + 16 ones = 3236. _____
- d) $537 = 400 + 13 + 7$. _____

3. The number 2,538 can be named in many ways. Write some of them.

2,538:

Using the Number Line

The set of whole numbers greater than 28 but less than 33 is {29, 30, 31, 32}.



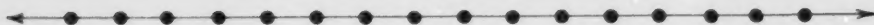
1. The set of whole numbers greater than 67 but less than 73 is { }.



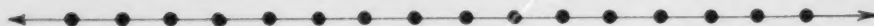
2. The set of whole numbers greater than 198 but less than 204 is { }.



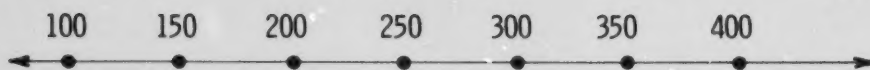
3. The set of whole numbers greater than 789 but less than 800 is { }.



4. The set of whole numbers greater than 993 but less than 1002 is { }.

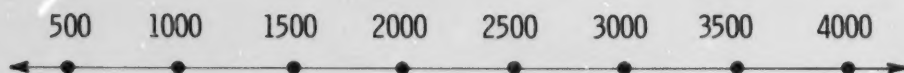


Comparing Numbers



Write $<$ or $>$ between each pair of numerals.

129	156	391	450	376	285
175	200	402	343	491	176
235	167	156	380	207	377
253	350	287	459	176	253



500	1500	3520	2001	3427	3548
2000	1000	756	1156	2763	3276
3500	2500	2356	2556	4051	4027
4000	500	3702	3046	1776	1492

The Sum of Two Numbers

Compute:

$52 + 37$	$83 + 16$
$26 + 42$	$43 + 55$
$72 + 13$	$14 + 44$

The Sum of Two Numbers

Compute:

$67 + 32$	$45 + 56$
$74 + 15$	$58 + 31$
$46 + 53$	$36 + 32$

The Sum of Two Numbers

Compute:

$362 + 507$	$450 + 249$
$743 + 253$	$804 + 194$
$512 + 466$	$277 + 702$

The Sum of Two Numbers

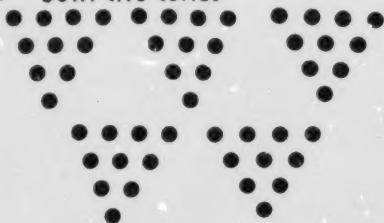
Compute:

$127 + 651$	$504 + 265$
$1645 + 8253$	$7064 + 1825$
$8403 + 1596$	$3754 + 5005$

The Sum of Two Numbers

Mary has a bouquet with 36 flowers. If Jill gives her a bouquet having 28 flowers, how many flowers will Mary have? We may write:

$$36 + 28 = \underline{\hspace{2cm}}$$

A. Think of 36 as:  (30 + 6)	B. Think of 28 as:  (20 + 8)
C. Join the tens:  (30 + 20)	D. Join the ones:  (6 + 8)

Do you see that we have another set of ten when we join the ones?

Make a ring around a set of ten.

$$6 + 8 = 10 + \underline{\hspace{1cm}}.$$

$$(30 + 20) + (10 + 4) = \underline{\hspace{2cm}}.$$

E. Join the new set of ten to the other sets of ten.

These are the ones.



(30 + 20 + 10)



(4)

$$(30 + 20 + 10) + 4 = 60 + 4 = 64$$

F. You can write:

$$36 + 28$$

$$36 = 30 + 6$$

$$28 = 20 + 8$$

$$50 + 14 = 50 + 10 + 4 = 64$$

OR

$$\begin{array}{r} 36 \\ + 28 \\ \hline 14 \\ 50 \\ \hline 64 \end{array}$$

Renaming Ones

Mark those for which you would rename 10 ones as 1 ten.

1) $27 + 35$

13) $45 + 9$

2) $57 + 26$

14) $42 + 56$

3) $54 + 25$

15) $67 + 23$

4) $73 + 27$

16) $57 + 16$

5) $41 + 14$

17) $34 + 57$

6) $43 + 26$

18) $23 + 64$

7) $35 + 40$

19) $89 + 7$

8) $26 + 38$

20) $66 + 27$

9) $37 + 48$

21) $47 + 29$

10) $74 + 13$

22) $28 + 39$

11) $29 + 8$

23) $33 + 52$

12) $25 + 18$

24) $17 + 64$

The Sum of Two Numbers

Compute:

$63 + 29$

$58 + 25$

$54 + 27$

$49 + 28$

$65 + 29$

$23 + 47$

The Sum of Two Numbers

Compute:

$76 + 18$	$67 + 19$
$58 + 7$	$59 + 38$
$35 + 46$	$47 + 9$

The Sum of Two Numbers

Compute:

1) $59 + 37 =$ _____

9) $63 + 19 =$ _____

2) $46 + 28 =$ _____

10) $54 + 37 =$ _____

3) $37 + 55 =$ _____

11) $63 + 28 =$ _____

4) $14 + 78 =$ _____

12) $15 + 75 =$ _____

5) $25 + 69 =$ _____

13) $39 + 59 =$ _____

6) $38 + 47 =$ _____

14) $28 + 69 =$ _____

7) $65 + 26 =$ _____

15) $47 + 39 =$ _____

8) $47 + 37 =$ _____

16) $29 + 28 =$ _____

The Sum of Two Numbers

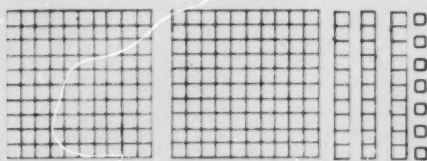
Ann has 237 stamps in her stamp collection.

Her grandmother gave her 126 more stamps.

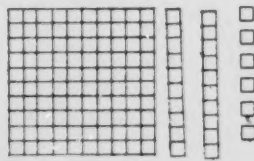
How many stamps does Ann have now?

We write: $237 + 126$

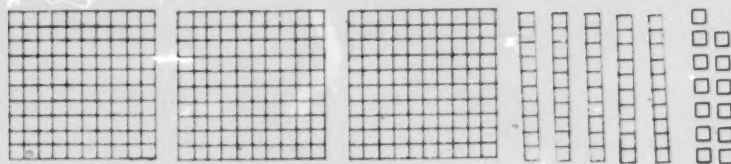
Think of 237 as:



Think of 126 as:



Join the hundreds, then the tens, and then the ones.



Think of 13 as $10 + 3$.

$$\text{So, } 237 + 126 = 300 + 50 + 13$$

$$= 300 + 60 + 3$$

$$= 363$$

We can write:

$$237 = 200 + 30 + 7$$

OR

$$126 = \underline{100} + \underline{20} + \underline{6}$$

$$300 + 50 + 13 = 300 + 60 + 3 = 363$$

$$\begin{array}{r} 237 \\ + 126 \\ \hline 13 \\ 50 \\ \hline 300 \\ \hline 363 \end{array}$$

Ann has 363 stamps.

The Sum of Two Numbers

Compute:

$$\begin{array}{r} 345 \\ + 249 \\ \hline \end{array}$$

$$\begin{array}{r} 538 \\ + 237 \\ \hline \end{array}$$

$$\begin{array}{r} 816 \\ + 185 \\ \hline \end{array}$$

$$\begin{array}{r} 248 \\ + 125 \\ \hline \end{array}$$

$$\begin{array}{r} 347 \\ + 226 \\ \hline \end{array}$$

$$\begin{array}{r} 723 \\ + 158 \\ \hline \end{array}$$

$$\begin{array}{r} 707 \\ + 105 \\ \hline \end{array}$$

$$\begin{array}{r} 349 \\ + 233 \\ \hline \end{array}$$

The Sum of Two Numbers

Compute:

$\begin{array}{r} 248 \\ +129 \\ \hline \end{array}$	$\begin{array}{r} 394 \\ +283 \\ \hline \end{array}$
$\begin{array}{r} 369 \\ +128 \\ \hline \end{array}$	$\begin{array}{r} 348 \\ +161 \\ \hline \end{array}$
$\begin{array}{r} 764 \\ + 29 \\ \hline \end{array}$	$\begin{array}{r} 586 \\ +123 \\ \hline \end{array}$
$\begin{array}{r} 459 \\ + 26 \\ \hline \end{array}$	$\begin{array}{r} 340 \\ +360 \\ \hline \end{array}$

The Sum of Two Numbers

Compute:

$204 + 567$	$348 + 236$
$753 + 239$	$546 + 329$
$728 + 267$	$806 + 187$

The Sum of Two Numbers

Compute:

$$437 + 243$$

$$461 + 279$$

$$537 + 256$$

$$825 + 137$$

$$347 + 268$$

$$158 + 629$$

The Sum of Two Numbers

Compute:

1) $532 + 149$

13) $409 + 217$

2) $304 + 177$

14) $268 + 206$

3) $348 + 29$

15) $74 + 16$

4) $502 + 378$

16) $67 + 208$

5) $37 + 156$

17) $146 + 726$

6) $848 + 129$

18) $848 + 108$

7) $325 + 39$

19) $37 + 207$

8) $207 + 308$

20) $475 + 206$

9) $206 + 385$

21) $671 + 329$

10) $81 + 19$

22) $106 + 87$

11) $469 + 317$

23) $164 + 206$

12) $36 + 407$

24) $129 + 69$

A Vacation Trip



1. Ed's parents took him to visit a park.
They drove 269 miles the first day.
The second day they went 317 miles.
How far did they travel in 2 days?
2. Ed saw 14 different car license plates.
The next day he saw 9.
He claims he saw 24 in 2 days.
Did he? How do you know?
3. On Monday 406 cars went into the park.
On Tuesday 375 more came in.
How many visited the park on Monday and Tuesday?
4. There were 14 bears and 8 deer along the road.
Ed saw them.
How many animals did he see?
5. Ed ate \$6.38 worth of food,
His share of the motel bill was \$3.38.
What did his trip cost his father?

Finding the Sum of Two Numbers

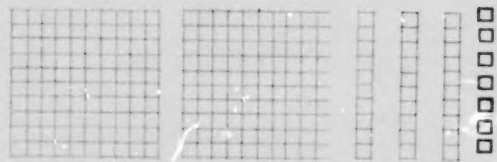
Ann had 237 stamps in her collection.

Her grandmother gave her 191 more stamps.

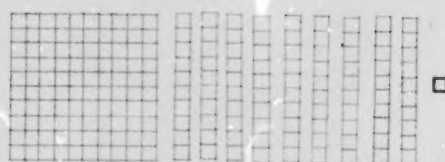
How many stamps does Ann have now?

We write: $237 + 191$

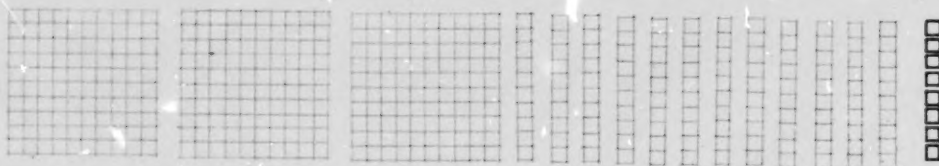
Think of 237 as:



Think of 191 as:



Join the hundreds, then the tens, and then the ones.



Think of 12 tens as $100 + 20$.

$$\begin{aligned}\text{So, } 237 + 191 &= 300 + 120 + 8 \\ &= 300 + 100 + 20 + 8 \\ &= 400 + 20 + 8 \\ &= 428\end{aligned}$$

We can write:

$$\begin{aligned}237 &= 200 + 30 + 7 \\ 191 &= 100 + 90 + 1 \\ \hline 300 + 120 + 8 \\ 400 + 20 + 8 &= 428\end{aligned}$$

OR

$$\begin{array}{r} 237 \\ + 191 \\ \hline 8 \\ 120 \\ 300 \\ \hline 428 \end{array}$$

Ann has 428 stamps.

Renaming Ten Tens

1) $300 + 170 + 8$ $400 + 70 + 8 = 478$	6) $400 + 190 + 2$ $\text{---} + \text{---} + \text{---} = \text{---}$
2) $500 + 120 + 7$ $\text{---} + \text{---} + \text{---} = \text{---}$	7) $800 + 130 + 3$ $\text{---} + \text{---} + \text{---} = \text{---}$
3) $100 + 140 + 6$ $\text{---} + \text{---} + \text{---} = \text{---}$	8) $600 + 160 + 6$ $\text{---} + \text{---} + \text{---} = \text{---}$
4) $700 + 150 + 0$ $\text{---} + \text{---} + \text{---} = \text{---}$	9) $100 + 100 + 5$ $\text{---} + \text{---} + \text{---} = \text{---}$
5) $200 + 100 + 8$ $\text{---} + \text{---} + \text{---} = \text{---}$	10) $800 + 190 + 9$ $\text{---} + \text{---} + \text{---} = \text{---}$

Renaming Ten Tens

$\begin{array}{r} 396 \\ +283 \\ \hline \end{array}$	$\begin{array}{r} 765 \\ +173 \\ \hline \end{array}$
$\begin{array}{r} 493 \\ +215 \\ \hline \end{array}$	$\begin{array}{r} 398 \\ +261 \\ \hline \end{array}$
$\begin{array}{r} 613 \\ +196 \\ \hline \end{array}$	$\begin{array}{r} 384 \\ +263 \\ \hline \end{array}$
$\begin{array}{r} 794 \\ +173 \\ \hline \end{array}$	$\begin{array}{r} 342 \\ +166 \\ \hline \end{array}$

Renaming Ten Tens

$783 + 643 = \underline{\hspace{2cm}}$

$495 + 192 = \underline{\hspace{2cm}}$

$496 + 213 = \underline{\hspace{2cm}}$

$384 + 571 = \underline{\hspace{2cm}}$

$764 + 142 = \underline{\hspace{2cm}}$

$135 + 284 = \underline{\hspace{2cm}}$

$431 + 176 = \underline{\hspace{2cm}}$

$327 + 292 = \underline{\hspace{2cm}}$

Renaming Ten Tens

Compute the sum.

$395 + 282$	$784 + 192$
$651 + 263$	$493 + 276$
$364 + 273$	$487 + 161$
$276 + 550$	$386 + 253$

Uncle Jim's Farm

1. Uncle Jim lives 170 miles from Boys' Town.
Boys' Town is 268 miles from White City.
Uncle Jim drove to White City by way of Boys' Town.
How many miles did he travel?
2. Jane visited the farm.
She saw 76 cows along the highway.
Uncle Jim has many horses.
She counted 52.
Did she see more than 100 animals?
3. On the farm are 784 hens.
There are 20 roosters.
How many chickens does Uncle Jim have?
4. Last year Uncle Jim made \$475 in wheat.
The corn crop was worth \$450.
How much money did he make on grain?
5. The hired man put 170 bales of hay in the barn.
He did the same thing the next week.
How many bales of hay did he store?

Renaming the Sum

1) $93 - 48$

$93 = \underline{80} + \underline{13}$

2) $47 - 19$

$47 = \underline{\quad} + \underline{\quad}$

3) $54 - 28$

$54 = \underline{\quad} + \underline{\quad}$

4) $63 - 27$

$63 = \underline{\quad} + \underline{\quad}$

5) $97 - 19$

$97 = \underline{\quad} + \underline{\quad}$

6) $55 - 26$

$55 = \underline{\quad} + \underline{\quad}$

7) $74 - 56$

$74 = \underline{\quad} + \underline{\quad}$

8) $21 - 17$

$21 = \underline{\quad} + \underline{\quad}$

9) $36 - 18$

$36 = \underline{\quad} + \underline{\quad}$

10) $95 - 27$

$95 = \underline{\quad} + \underline{\quad}$

11) $71 - 38$

$71 = \underline{\quad} + \underline{\quad}$

12) $65 - 48$

$65 = \underline{\quad} + \underline{\quad}$

13) $44 - 19$

$44 = \underline{\quad} + \underline{\quad}$

14) $52 - 39$

$52 = \underline{\quad} + \underline{\quad}$

Computing the Difference Between Two Numbers

$75 - 28 = \underline{\hspace{2cm}}$ $\begin{array}{r} 75 \\ - 28 \\ \hline \end{array} = \begin{array}{r} 60 + 15 \\ (20 + 8) \\ \hline 40 + 7 = 47 \end{array}$	$68 - 29 = \underline{\hspace{2cm}}$ $\begin{array}{r} 68 \\ - 29 \\ \hline \end{array}$
$84 - 16 = \underline{\hspace{2cm}}$ $\begin{array}{r} 84 \\ - 16 \\ \hline \end{array}$	$46 - 27 = \underline{\hspace{2cm}}$ $\begin{array}{r} 46 \\ - 27 \\ \hline \end{array}$
$53 - 24 = \underline{\hspace{2cm}}$ $\begin{array}{r} 53 \\ - 24 \\ \hline \end{array}$	$35 - 17 = \underline{\hspace{2cm}}$ $\begin{array}{r} 35 \\ - 17 \\ \hline \end{array}$
$92 - 65 = \underline{\hspace{2cm}}$ $\begin{array}{r} 92 \\ - 65 \\ \hline \end{array}$	$62 - 48 = \underline{\hspace{2cm}}$ $\begin{array}{r} 62 \\ - 48 \\ \hline \end{array}$

Computing the Difference

$$92 - 85 = \underline{\hspace{2cm}}$$

$$94 - 76 = \underline{\hspace{2cm}}$$

$$56 - 39 = \underline{\hspace{2cm}}$$

$$75 - 58 = \underline{\hspace{2cm}}$$

$$25 - 17 = \underline{\hspace{2cm}}$$

$$86 - 29 = \underline{\hspace{2cm}}$$

Computing the Difference

$$75 - 39 = \underline{\hspace{2cm}}$$

$$53 - 34 = \underline{\hspace{2cm}}$$

$$64 - 18 = \underline{\hspace{2cm}}$$

$$63 - 17 = \underline{\hspace{2cm}}$$

$$82 - 24 = \underline{\hspace{2cm}}$$

$$81 - 27 = \underline{\hspace{2cm}}$$

Finding the Difference Between Two Numbers

46 and 19	43 and 25
92 and 47	62 and 44
53 and 26	51 and 26
84 and 35	67 and 39
74 and 39	45 and 16
82 and 25	52 and 19



The Birthday Party

- 1) Bill invited 35 children to his party.
Yesterday his mother bought a package of balloons.
There were 18 balloons in the package.
Bill wants to give each child a balloon.
How many more balloons does he need ?

- 2) There are 50 candles in a box.
Bill is 8 years old.
How many candles will not be used ?

- 3) Bill received 29 gifts.
How many children did not bring a gift ?

- 4) John brought Bill a box of marbles.
Bill had 56 marbles.
Now he has 94.
How many marbles were in the box ?

- 5) There were 19 boys at the party.
How many girls were there ?

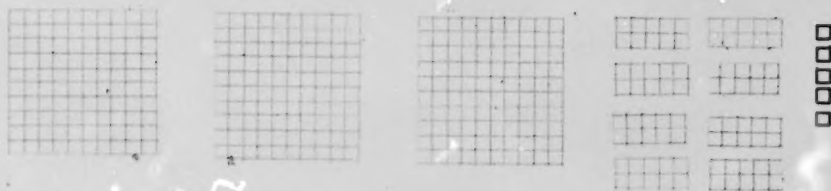
Finding the Difference Between Two Numbers

Wayne has 385 stamps. He put 152 of them in a stamp book.

How many more does he have to put in the stamp book?

We write: $385 - 152 =$ _____

Think of 385 as: $300 + 80 + 5$



We want to remove 152.

Think of 152 as $100 + 50 + 2$

Think of removing 152 by ringing 1 set of one hundred, 5 sets of ten, and 2 sets of one.

Write the number of members in the set that is left.

_____ hundreds, _____ tens, _____ ones.

We can write this: _____ + _____ + _____ = _____

$$\begin{array}{r} 300 + 80 + 5 \\ - (100 + 50 + 2) \\ \hline 200 + 30 + 3 = \end{array}$$

Wayne has _____ more stamps to put in his book.

Computing the Difference Between Two Numbers

$534 - 123 = \underline{\hspace{2cm}}$	$758 - 325 = \underline{\hspace{2cm}}$
$947 - 314 = \underline{\hspace{2cm}}$	$862 - 531 = \underline{\hspace{2cm}}$
$428 - 216 = \underline{\hspace{2cm}}$	$753 - 443 = \underline{\hspace{2cm}}$
$698 - 264 = \underline{\hspace{2cm}}$	$589 - 263 = \underline{\hspace{2cm}}$

The Difference Between Two Numbers

Compute:

$384 - 162 = \underline{\hspace{2cm}}$	$765 - 334 = \underline{\hspace{2cm}}$
$987 - 234 = \underline{\hspace{2cm}}$	$905 - 704 = \underline{\hspace{2cm}}$
$879 - 235 = \underline{\hspace{2cm}}$	$598 - 275 = \underline{\hspace{2cm}}$
$374 - 152 = \underline{\hspace{2cm}}$	$384 - 163 = \underline{\hspace{2cm}}$

Renaming the Sum

1) $448 - 129$

$$448 = 400 + 30 + 18$$

2) $572 - 227$

$$572 = \text{---} + \text{---} + \text{---}$$

3) $740 - 235$

$$740 = \text{---} + \text{---} + \text{---}$$

4) $571 - 329$

$$571 = \text{---} + \text{---} + \text{---}$$

5) $884 - 366$

$$884 = \text{---} + \text{---} + \text{---}$$

6) $793 - 458$

$$793 = \text{---} + \text{---} + \text{---}$$

7) $366 - 138$

$$366 = \text{---} + \text{---} + \text{---}$$

8) $857 - 248$

$$857 = \text{---} + \text{---} + \text{---}$$

Computing Differences

$\begin{array}{r} 672 \\ - 235 \\ \hline \end{array}$
$\begin{array}{r} 591 \\ - 347 \\ \hline \end{array}$
$\begin{array}{r} 894 \\ - 488 \\ \hline \end{array}$
$\begin{array}{r} 750 \\ - 237 \\ \hline \end{array}$

Computing the Difference Between Two Numbers

$$348 - 129$$

$$761 - 356$$

$$532 - 318$$

$$974 - 538$$

$$883 - 647$$

Finding Differences

Find the difference between each pair of numbers.

1) 391 and 269	6) 289 and 168
2) 994 and 267	7) 678 and 339
3) 792 and 269	8) 387 and 178
4) 545 and 237	9) 963 and 238
5) 434 and 329	10) 852 and 548

Renaming the Sum

1) $327 - 184$

$$327 = 200 + 120 + 7$$

2) $809 - 582$

$$809 = \text{---} + \text{---} + \text{---}$$

3) $548 - 296$

$$548 = \text{---} + \text{---} + \text{---}$$

4) $739 - 546$

$$739 = \text{---} + \text{---} + \text{---}$$

5) $610 - 250$

$$610 = \text{---} + \text{---} + \text{---}$$

6) $768 - 473$

$$768 = \text{---} + \text{---} + \text{---}$$

7) $346 - 173$

$$346 = \text{---} + \text{---} + \text{---}$$

8) $218 - 192$

$$218 = \text{---} + \text{---} + \text{---}$$

Finding Differences

Find the difference between each pair of numbers.

1) 349 and 184 $\begin{array}{r} 200 + 140 + 9 \\ (100 + 80 + 4) \\ \hline 100 + 60 + 5 = \end{array}$	6) 539 and 284
2) 901 and 290	7) 504 and 242
3) 847 and 283	8) 928 and 296
4) 638 and 293	9) 588 and 297
5) 427 and 295	10) 650 and 180

Computing the Difference

$$615 - 283$$

$$719 - 237$$

$$476 - 285$$

$$827 - 265$$

Computing the Difference

$$514 - 123$$

$$947 - 254$$

$$428 - 286$$

$$618 - 264$$

$$728 - 375$$

Computing the Difference

871 - 390

708 - 345

557 - 273

469 - 283

673 - 280

What must be renamed?

1) 347 - 128	100	(10)	1
2) 814 - 381	100	10	1
3) 73 - 48	100	10	1
4) 132 - 29	100	10	1
5) 49 - 27	100	10	1
6) 205 - 91	100	10	1
7) 981 - 257	100	10	1
8) 604 - 391	100	10	1
9) 876 - 59	100	10	1
10) 603 - 291	100	10	1
11) 540 - 239	100	10	1
12) 809 - 397	100	10	1

Some Problems to Solve

1. 969 children go to our school. There are 175 in the first grade. How many are not in the first grade?

_____ are not.

3. The baseball team played 162 games. They lost 91 of them. How many did they win?

_____ They won _____ games.

2. The third grade gave \$3.30 to the Red Cross. This was \$.50 more than the sixth grade collected. How much did the sixth grade give?

_____ They gave _____.

4. Joe is reading a book. The book has 302 pages. He has read 150 pages. How many pages are left to read?

He has _____ pages to read.

Problem Solving

Jerry had _____ blocks. He found _____ blocks. How many blocks does Jerry have now? _____ Jerry has _____ blocks.	Beth had _____ apples. She gave _____ apples to Bill. How many apples does Beth have? _____ Beth has _____ apples.
Sue needs _____ bags. She has _____ bags. How many more bags does she need? _____ Sue needs _____ bags.	Mother had _____ cookies. Father took _____ of them. How many cookies does Mother have now? _____ Mother has _____ cookies.

Problem Solving

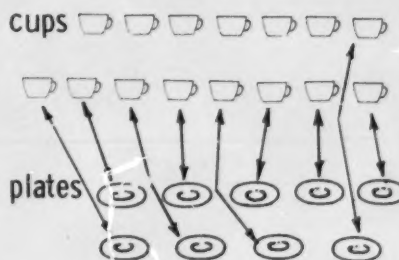
Draw pictures to help solve the problem.

Judy and Susan were playing house.

Judy brought out 9 toy plates.

Susan brought out 15 toy cups.

How many more cups than plates did the girls have?



There were _____ more cups than plates.

Bob and Kim went to the store to buy some candy.

Bob got 12 pieces of candy.

Bob's candy

Kim got 18 pieces of candy.

Find how many more pieces of candy

Kim had than Bob had.

Kim's candy

Kim had _____ more pieces of candy.

Solving Problems

1. Jan and Mark were going to play garage.

Jan had 12 toy trucks.

Mark had 21 toy cars.

How many more cars than trucks were there?

There were _____ more cars than trucks.

2. Bill and Glenn were going to the store.

Bill had 33 cents.

Glenn had 18 cents.

How many fewer cents did Glenn have than Bill had?

Glenn had _____ fewer cents than Bill had.

3. Susan's mother has 2 dozen pencils.

Susan has 9 pencils.

How many more pencils does Susan's mother have than Susan has?

Susan's mother has _____ more pencils.

4. Jack ate 12 pancakes.
Father ate 9 pancakes.
Father ate how many fewer pancakes than Jack?

Father ate _____ fewer pancakes.

5. Sally and Beth have 22 books.
Bob and Jim have 17 books.
How many more books do the girls have
than have the boys?

The girls have _____ more books.

6. Twenty-five crows were sitting on a fence.
Forty-one cows were in the field.
How many fewer crows than cows were there?

There were _____ fewer crows than cows.

7. Tom caught 21 fish.

Father and Mother each caught 8 fish.

Find how many more fish Tom caught than his parents caught.

Tom caught _____ more fish than his parents caught.

8. There were 43 elm and 28 oak trees in the park.

How many more elm trees than oak trees were in the park?

There were _____ more elm trees than oak trees.

Solving Problems

Find the answer and write the answer sentence.

1. Miss Brown had 78 sheets of red paper and 29 sheets of blue paper.

Find how many fewer sheets of blue paper than red paper Miss Brown had.

2. Miss Brown asked Judy to get the paint brushes.

Judy got 32 wide brushes and 19 narrow brushes.

How many more wide brushes than narrow brushes did she get?

3. The first box of colored chalk had 43 pieces.

The second box of chalk had 28 pieces.

How many more pieces were in the first box than in the second box?

4. Miss Brown said that she had 63 pairs of scissors and that Miss Stone had only 38 pairs of scissors. How many fewer pairs of scissors did Miss Stone have than Miss Brown had?

5. In the A parking lot there were 247 cars. In the B parking lot there were 173 cars. Find how many more cars were in the A lot than in the B lot.

6. There were 97 sport cars in the A lot. There were 129 standard cars in the A lot. How many fewer sport cars than standard cars were there in the A lot?

7. There were 67 sport cars in the B lot. There were 96 standard cars in the B lot. Find how many more standard cars than sport cars were in the B lot.

8. All together there were 150 station wagons in lots A and B.

There were 31 trucks parked there.

How many more station wagons than trucks were there in the lots?

Problem Solving

Write the equation that will help solve the problem.

Put the () where they belong in your equations.

1. Judy had 6 records

$$n = (6 + 3) - 2$$

She bought 3 more records.

$$n = 9 - 2$$

On the way home she broke 2 records.

How many records does Judy have now?

$$n = 7$$

2. Jim had 2 shirts and his mother bought
3 new shirts for him.

His grandmother sent a new shirt for his
birthday.

Now how many shirts does Jim have?

3. Beth borrowed 6 crayons from Susan.

That afternoon she returned 4 crayons
to Susan.

Then she borrowed 3 crayons from
Jerry.

How many borrowed crayons does Beth have?

4. Mrs. White had only 4 eggs so she
bought a dozen eggs.

How many eggs did she have after she
put 6 eggs into a cake?

5. 14 cars were in the parking lot.

6 cars came to park and 4 cars
drove away.

How many cars were in the parking
lot then?

6. Mr. Black planted 4 oak trees.

Next he planted 3 maple trees.

Last of all he planted 5 elm trees.

How many trees did he plant?

7. Mother made 8 red aprons and
5 blue aprons.

She gave 4 blue aprons away.

How many aprons does she have now?

8. Sally had 12 cents.

She gave 5 cents to Bill.

Later Father gave 3 cents to Sally.

How many cents does Sally have now?

Set 1

Solving Problems

Write an equation and complete the answer sentence.

1. The popcorn man had 75 bags of popcorn to sell.
At the end of the day he had 17 bags left.
How many were sold?

_____ bags of popcorn were sold.

2. Bill and Bob counted cars as they walked home.
Bill counted 67 cars and Bob counted 86 cars.
How many cars did they both count?

They counted _____ cars.

3. In a spelling contest Jim's team made 32 points.
Henry's team made 17 points.
By how many points did Jim's team win?

Jim's team won by _____ points.

4. Sue picked flowers for her teacher.
She picked 49 daisies and a dozen tulips.
How many flowers did she pick?

Sue picked _____ flowers for her teacher.

Set 2

Solving Problems

Write an equation and complete the answer sentence.

1. William has 14 pencils. If his mother gives him 12 more, how many pencils will he have?

William will have _____ pencils.

2. James is 21 years old. He is 13 years older than his brother. How old is his brother?

His brother is _____ years old.

3. John's teacher has 25 pieces of chalk. If she gives John 8 pieces, how many will she have?

She will have _____ pieces of chalk.

4. If Pete spends 25¢ on oranges and 31¢ on bananas, how much will he have spent on fruit?

He will have spent _____ on fruit.

5. The Carpenters' dog Rover just had 10 puppies. Their other dog, Fido, had 6 puppies a month ago. How many puppies did both dogs have?

Both dogs had _____ puppies.

6. Mr. Barton is 40 years old. Mr. Hill is 19 years old. How much older than Mr. Hill is Mr. Barton?

Mr. Barton is _____ years older than Mr. Hill.

7. If Mr. Jackson catches 14 fish and his wife catches 15 fish, how many fish do they catch in all?

They catch _____ fish.

8. Mickey hit 54 home runs. He hit 20 more than Dave. How many home runs did Dave hit?

Dave hit _____ home runs.

9. Tim had 13 pears. Jeff gave him 4 apples. How many pieces of fruit does Tim have now?

Tim has _____ pieces of fruit.

10. A football club has 30 members. Only 14 members played in their big game. How many members did not play?

_____ members did not play.

11. Roger is 18 years old. He has a brother named Max. If the sum of Roger's and Max's ages is 32, how old is Max?

Max is _____ years old.

12. Timothy needs 98¢. He has 25¢ now. How much will he have to earn before he has 98¢?

He must earn _____.

13. Bill had 50 marbles. He gave Jerome 14 of them.
How many marbles does Bill have now?

Bill has _____ marbles.

14. Mr. Singer has 40 chickens. He bought a chicken house that can hold 90 chickens. How many more chickens will he need to fill his chicken house?

He will need _____ chickens.

15. Patty had some jelly beans. Kim gave her 16 more and now she has 34. How many did she have at first?

She had _____ jelly beans.

16. There were 43 trees on one street. On another street there were 56 trees. How many trees were there on both streets?

There were _____ trees on both streets.

Solving Problems

Set 3

Write an equation and an answer sentence.

1. Mary's sister was 15 years old. Mary was 5 years younger than her sister. How old was Mary?

2. The boys in Mrs. Jones' class wanted to play baseball. They needed 18 members for two teams. There were only 11 boys on the field. How many more boys were needed before the game could begin?

3. Carol had to walk 9 blocks to school. Jane had to walk 13 blocks. Which girl had to walk farther? How many more blocks did she have to walk?

4. Alice's new baby sister weighed only 7 pounds. Alice weighed 35 pounds. How many more pounds did Alice weigh than her baby sister?

5. Susie baked 2 dozen cookies. She needed 3 dozen for the class party. How many more cookies did she have to bake?

6. There were 34 children in the class. Nineteen of these were boys. How many girls were in the class?

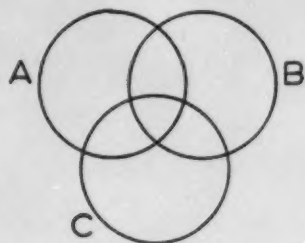
7. Sixty-two children had parts in a play. There were 80 parts to be filled. How many more children were needed?

8. George and Jerry rode their bikes 22 blocks from Jerry's house to the store. On the way home George stopped at his house which was only 7 blocks from the store. How many more blocks did Jerry have to ride to get home?

9. Linda has earned 25 cents. She wants to buy a tea set that costs 59 cents. How much more money does she need?

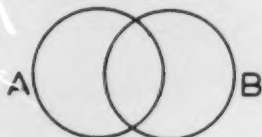
★ Overlapping Sets

1. Here are three circles A, B, C.



- (a) Find a point that is inside all three circles. Mark that point with a dot.
- (b) Now find a point that is inside circles B and C but outside circle A. Mark this point with a small X.
- (c) Now find a point that is inside circle B but outside circles A and C. Mark this point with a small o.
- (d) Now find a point that is outside all of the circles. Mark this point with a small box.

2. Here are two circles.



- (a) Put five dots in the region that is inside both circles.
- (b) Put three dots inside circle A but outside circle B.
- (c) Put four dots inside circle B but outside circle A.

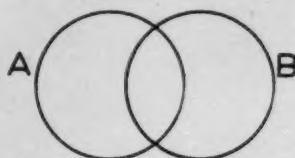
How many dots are in circle A? _____

How many dots are in circle B? _____

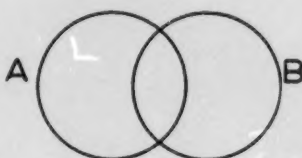
How many dots are in the picture all together? _____

How many dots are both in circle A and in circle B? _____

3. Can you put 3 dots in this picture so that there are exactly 2 dots in circle A and 2 dots in circle B? _____



4. What is the smallest number of dots you can put in this picture and still have five dots in circle A and four dots in circle B? _____



5. It is rainy today, so each pupil in Miss Black's class has brought either a raincoat or an umbrella. Six raincoats and seven umbrellas are hanging in the cloak-room. Two pupils brought both an umbrella and a raincoat. How many pupils are in Miss Black's class? _____
6. Mr. Adams has nine birds in his pet shop. Five of them are brightly colored and five of them have good singing voices. I would like to buy a brightly colored bird with a good singing voice. Do you think Mr. Adams has one? _____
- Why? _____
- _____

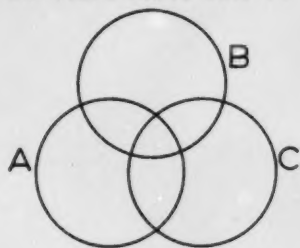
7. The Smiths and the Joneses are next door neighbors. The Smiths have 5 children, 3 of whom are girls. There are 6 boys in the two families. The Joneses have 4 children. How many of the Jones children are girls? _____

Here are the two houses. Put in X's for boys and O's for girls. This will help you find the answer.



8. Here are three circles A, B, and C. Can you put in three dots so that:

- circle A will have one dot in it?
- circle B will have two dots in it?
- circle C will have three dots in it?



★ Sequences

1. $1 + 2 = \underline{\hspace{2cm}}$

$1 + 2 + 3 = \underline{\hspace{2cm}}$

$1 + 2 + 3 + 4 = \underline{\hspace{2cm}}$

$1 + 2 + 3 + 4 + 5 = \underline{\hspace{2cm}}$

2. $9 + 8 = \underline{\hspace{2cm}}$

$9 + 8 - 7 = \underline{\hspace{2cm}}$

$9 + 8 - 7 - 6 = \underline{\hspace{2cm}}$

$9 + 8 - 7 - 6 + 5 = \underline{\hspace{2cm}}$

$9 + 8 - 7 - 6 + 5 + 4 = \underline{\hspace{2cm}}$

$9 + 8 - 7 - 6 + 5 + 4 - 3 = \underline{\hspace{2cm}}$

$9 + 8 - 7 - 6 + 5 + 4 - 3 - 2 = \underline{\hspace{2cm}}$

3. $8 + 7 = \underline{\hspace{2cm}}$

$8 + 7 - 3 = \underline{\hspace{2cm}}$

$8 + 7 - 3 + 1 = \underline{\hspace{2cm}}$

$8 + 7 - 3 + 1 - 9 = \underline{\hspace{2cm}}$

4. $7 + 8 - 6 - 7 = \underline{\hspace{2cm}}$

Let's change the order of the numbers:

$7 - 7 + 8 - 6 = \underline{\hspace{2cm}}$

Is the answer the same? $\underline{\hspace{2cm}}$

5. Let's try that again.

$9 + 6 + 4 =$

Now change the order of the numbers:

$$6 + 4 + 9 =$$

Is the answer the same?

Which order do you like better?

Why? _____

6. $7 + 9 + 3 + 1 =$ _____

Can you change the order of the numbers so that the addition is easier?

How? _____

7. $8 + 5 - 7 - 4 =$ _____

8. $3 + 9 + 7 - 1 =$ _____

9. $3 + 8 + 4 + 3 =$ _____

10. There are 2 planets closer to the sun than the earth. There are 6 planets farther from the sun than the earth. How many planets are there all together? (Do not forget the earth; it is a planet too!)

11. Last year Mr. Frank had these trees in his yard:

4 maples

5 oaks

7 elms

3 birches

During the winter a storm knocked down 2 birches and
this summer the Dutch elm disease killed 4 of the elms.

How many trees does Mr. Frank have now? _____

12. Each day a jet airplane flies from New York to Chicago and then
from Chicago to San Francisco. One day 30 passengers rode
all the way from New York to San Francisco, 80 passengers rode
only as far as Chicago, and 70 passengers got on at Chicago
and rode to San Francisco.

How many people rode on the plane that day? _____

How many people were on the plane between New York
and Chicago? _____

How many people were on the plane between Chicago and
San Francisco? _____

★Sums

1. Here is a set of numbers:

3, 2, 9, 6

Find a subset of these numbers whose sum is 8. Cross out the numbers you have chosen and write them into this equation.

$$\underline{\quad\quad} + \underline{\quad\quad} = 8.$$

The sum of the numbers left over should be 12. Write them in:

$$\underline{\quad\quad} + \underline{\quad\quad} = 12.$$

2. Do this one the same way. Cross out the numbers as you put them into the equations. Use each number only once.

1, 7, 5, 8

$$\underline{\quad\quad} + \underline{\quad\quad} = 6$$

$$\underline{\quad\quad} + \underline{\quad\quad} = 15$$

3. Now do this one:

8, 4, 3, 9, 4

$$\underline{\quad\quad} + \underline{\quad\quad} = 17$$

$$\underline{\quad\quad} + \underline{\quad\quad} + \underline{\quad\quad} = 11$$

Can you find a subset of three numbers that add up to 17, leaving a subset of two numbers that add up to 11?

$$\underline{\quad\quad} + \underline{\quad\quad} + \underline{\quad\quad} = 17$$

$$\underline{\quad\quad} + \underline{\quad\quad} = 11$$

4. This time write in your own plus signs.

7, 8, 2, 6, 1

_____ 14

_____ 10

Find another way to do this one:

_____ 14

_____ 10

5. Now do these the same way:

(a) 5, 4, 8, 3

(b) 9, 8, 3, 6

_____ 8

_____ 17

_____ 12

_____ 9

(c) 6, 5, 8, 4, 7

(d) 9, 8, 7, 6, 2

_____ 15

_____ 17

_____ 15

_____ 15

6. Look back at Problem 5. How many ways can you find to do each of those examples.

(a) _____

(b) _____

(c) _____

(d) _____

7. Here are some with three equations to fill in.
Remember to use each number only once.

(a) 7, 2, 9, 3, 6, 6

$$\underline{\hspace{2cm}} = 9$$

$$\underline{\hspace{2cm}} = 11$$

$$\underline{\hspace{2cm}} = 13$$

(b) 13, 5, 9, 3, 2, 9

$$\underline{\hspace{2cm}} = 18$$

$$\underline{\hspace{2cm}} = 15$$

$$\underline{\hspace{2cm}} = 8$$

(c) 8, 6, 9, 8, 5, 9

$$\underline{\hspace{2cm}} = 14$$

$$\underline{\hspace{2cm}} = 15$$

$$\underline{\hspace{2cm}} = 16$$

8. Make two equations out of these numbers. Use each number once and only once. If you like you may put two or more numbers on the right side of the equation.

1, 2, 3, 4, 5, 6, 7

_____ = _____

_____ = _____

9. This time make three equations. Remember to use each number once and only once.

5, 13, 7, 5, 9, 16, 13

_____ = _____

_____ = _____

_____ = _____

★ Magic Squares

1. Here is an array of numbers.

1	5	2	8
3	1	8	
4	2	2	



Add the numbers in the rows and put the sums you get in the boxes at the right. The first one is done for you. Now add the numbers in the columns and put the sums in the circles along the bottom.

What is the sum of the numbers in the boxes? _____

What is the sum of the numbers in the circles? _____

Now look back at the array.

What is the sum of the nine numbers in the array? _____

Are the three sums you have just found all the same? _____

Why? _____

2. Here is an array with some numbers missing. Fill in the missing numbers so that the row sums and the column sums are all correct.

0		1
1		1

1
2
3

1	2	3
---	---	---

3. Now try this one:

7	7	
	8	
		9

20
20
20

20	20	20
----	----	----

4. How many ways are there to do this one? _____

9		
	9	
		9

24

24

24

24

24

24

5. Here is one with four rows and four columns.

2	4	6	
	6		0
8			9
	7	7	

20

20

20

20

20

20

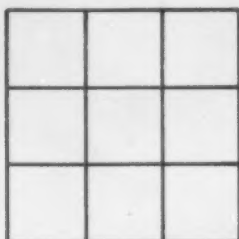
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20

6. To do this one use each of the numbers

1, 2, 3, 4, 5, 6, 7, 8, 9

once and only once.



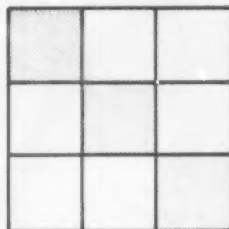
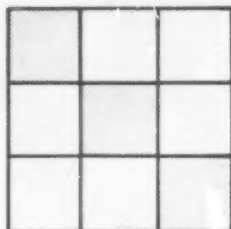
15

15

15

15 15 15

7. Two subsets of an array are called diagonal subsets. In the arrays below the diagonal subsets are shaded:



Now do Problem 5 in such a way that the sums of the diagonal subsets are also to equal to 15.

The array you will find is called a "magic square."

★Roman Numeral Arithmetic

In this lesson we are going to learn to do some arithmetic with Roman numerals. You have probably seen Roman numerals on clocks or in books.

Here are the first twelve:

		5	V		10	X	
1	I		6	VI		11	XI
2	II		7	VII		12	XII
3	III		8	VIII			
4	IIII		9	VIIII			

This is the way the numerals were written in the early days of Rome.

In later times 4 was sometimes written IV and 9 was sometimes written IX. In this lesson, however, we will write 4 with four I's and 9 with a V and four I's in the manner of the early Romans. This will make the arithmetic easier.

Let's begin by writing some more Roman numerals. The Romans used these letters:

I	for	1
V	for	5
X	for	10
L	for	50
C	for	100

They also had some more letters for greater numbers, but we won't talk about those now. To find out what number a Roman numeral stands for, you just add all the numbers that the letters stand for. For example:

$$XI = 10 + 1 = 11$$

Here are some other examples:

$$XVI = 10 + 5 + 1 = 16$$

$$XIII = 10 + 1 + 1 + 1 = 13$$

$$CLXXV = 100 + 50 + 10 + 10 + 5 = 175$$

1. What numbers do these Roman numerals stand for?

Write out the sum as shown above.

$$VIII = \underline{\hspace{2cm}}$$

$$LXV = \underline{\hspace{2cm}}$$

$$CXI = \underline{\hspace{2cm}}$$

$$XXXVI = \underline{\hspace{2cm}}$$

$$CCLXII = \underline{\hspace{2cm}}$$

2. Here is a simple addition in Roman numerals:

$$VI + II = VIII$$

To add VI and II all you have to do is put together all the letters in both numerals. Think about why this is so. Here are some more additions that can be done in this simple way:

$$\begin{array}{rcl} \text{XI} + \text{I} & = & \underline{\hspace{2cm}} \\ \text{XXV} + \text{II} & = & \underline{\hspace{2cm}} \\ \text{X} + \text{XVI} + \text{III} & = & \underline{\hspace{2cm}} \\ \text{LX} + \text{XV} & = & \underline{\hspace{2cm}} \end{array}$$

Now check your work by changing the Roman numerals into your everyday numbers.

3. The early Romans always wrote the letters in order: first the C's, then the L's, then the X's, then the V's, then the I's. Sometimes to do addition you have to rearrange the letters. Try these. The first one is done for you.

$$\begin{array}{rcl} \text{XII} + \text{VI} & = & \underline{\text{XVIII}} \\ \text{XII} + \text{V} & = & \underline{\hspace{2cm}} \\ \text{XXIII} + \text{VI} & = & \underline{\hspace{2cm}} \\ \text{LXI} + \text{VII} & = & \underline{\hspace{2cm}} \\ \text{CXV} + \text{LI} + \text{X} & = & \underline{\hspace{2cm}} \end{array}$$

4. Now try these. The first one is done for you.

$$\begin{array}{rcl} \text{CXI} + \text{LVI} & = & \underline{\text{CLXVII}} \\ \text{CXXII} + \text{LVI} & = & \underline{\hspace{2cm}} \\ \text{V} + \text{CCXIII} + \text{LI} & = & \underline{\hspace{2cm}} \\ \text{LII} + \text{XXXI} + \text{CV} & = & \underline{\hspace{2cm}} \end{array}$$

5. So far we have just put together all the letters in the numbers to be added. Sometimes addition is a little more complicated. If, for example, we just put together the letters in this addition example:

$$\text{III} + \text{II}$$

we get IIIII. But the Romans never wrote five I's together. Instead, they wrote V. Here are the rules the Romans used:

- (1) No numeral ever has more than four I's in it.
- (2) No numeral ever has more than one V in it.
- (3) No numeral ever has more than four X's in it.
- (4) No numeral ever has more than one L in it.
- (5) No numeral ever has more than four C's in it.

6. The Romans also used these letters:

D for 500

M for 1000

What do you think the Romans' rule for D was?

- (6) No numeral ever has more than _____ D in it.

7. Now use these rules when you do the following addition examples.

The first two are done for you.

$$\text{III} + \text{II} = \underline{\text{V}}$$

$$\text{XIII} + \text{III} = \underline{\text{XVI}}$$

$$\text{XXXIII} + \text{III} = \underline{\hspace{2cm}}$$

$$\text{CII} + \text{XI} + \text{LII} = \underline{\hspace{2cm}}$$

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$$\text{CXII} + \text{XXII} + \text{I} = \underline{\hspace{2cm}}$$

$$\text{DX} + \text{DI} = \underline{\hspace{2cm}}$$

8. Now do these:

$$\text{V} + \text{V} = \underline{\hspace{2cm}}$$

$$\text{CV} + \text{XVI} + \text{V} = \underline{\hspace{2cm}}$$

$$\text{VI} + \text{XV} = \underline{\hspace{2cm}}$$

$$\text{LV} + \text{XV} + \text{VII} = \underline{\hspace{2cm}}$$

$$\text{MCXI} + \text{V} + \text{XVII} = \underline{\hspace{2cm}}$$

$$\text{VIII} + \text{III} = \underline{\hspace{2cm}}$$

9. Now do these:

$$\text{XX} + \text{XXXV} = \underline{\hspace{2cm}}$$

$$\text{LV} + \text{CLV} = \underline{\hspace{2cm}}$$

$$\text{XXII} + \text{XXXIII} = \underline{\hspace{2cm}}$$

$$\text{MLV} + \text{XV} + \text{LVII} = \underline{\hspace{2cm}}$$

$$\text{CLVI} + \text{LXII} + \text{LII} = \underline{\hspace{2cm}}$$

$$\text{XXX} + \text{XV} + \text{DVI} = \underline{\hspace{2cm}}$$

10. Our numerals 1, 2, 3, 4, ... are called Arabic numerals. Write these problems in Roman numerals. Then do them in Roman numerals. Check your answer by adding the regular way. The first one is done for you.

$$\begin{array}{rcl} 27 + 18 & = & 45 \\ \hline \text{XXVII} + \text{XVIII} & = & \text{XXXXV} \\ \hline \end{array}$$

$$\begin{array}{rcl} 55 + 24 & = & \underline{\hspace{2cm}} \\ \hline & = & \underline{\hspace{2cm}} \end{array}$$

$$\begin{array}{rcl} 63 + 14 & = & \underline{\hspace{2cm}} \\ \hline & = & \underline{\hspace{2cm}} \end{array}$$

$$\begin{array}{rcl} 107 + 86 & = & \underline{\hspace{2cm}} \\ \hline & = & \underline{\hspace{2cm}} \end{array}$$

$$\begin{array}{rcl} 36 + 335 & = & \underline{\hspace{2cm}} \\ \hline & = & \underline{\hspace{2cm}} \end{array}$$

$$\begin{array}{rcl} 1247 + 115 & = & \underline{\hspace{2cm}} \\ \hline & = & \underline{\hspace{2cm}} \end{array}$$

11. Now try some subtraction. Figure out the rules for yourself.

$$\text{XXIII} - \text{XII} = \underline{\hspace{2cm}}$$

$$\text{VIII} - \text{III} = \underline{\hspace{2cm}}$$

$$\text{XVII} - \text{XVI} = \underline{\hspace{2cm}}$$

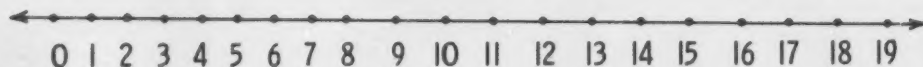
$$\text{X} - \text{V} = \underline{\hspace{2cm}}$$

$$\text{X} - \text{VII} = \underline{\hspace{2cm}}$$

$$\text{L} - \text{XX} = \underline{\hspace{2cm}}$$

Describing Points by Numbers

1.



Mark points A, B, C, D.

Point A has the coordinate 10.

Point B has the coordinate 3.

Point C has the coordinate 17.

Point D has the coordinate 12.

Complete the following:

The length of $\overline{AB}$ is $(10 - 3)$ units or _____ units.

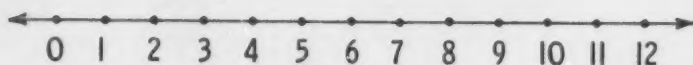
The length of $\overline{BC}$ is (_____) units or _____ units.

The length of $\overline{CD}$ is (_____) units or _____ units.

The total number of units in $\overline{AB}$, $\overline{BC}$, and $\overline{CD}$ is _____.

The distance from A to D is _____ units.

2.



Mark points A, B, C, D.

Point A has the coordinate 2.

Point B is 3 units to the right of A.

Point C is 5 units to the left of B.

Point D is 11 units to the right of C.

B has the coordinate _____.

C has the coordinate _____.

D has the coordinate _____.

The length of $\overline{BC}$ is _____ units.

The length of $\overline{AD}$ is _____ units.

Motion on a Line

1. When George goes home from school he passes a long fence. The picture shows the fence. The dots are the fence posts.



George likes to describe the posts with whole numbers.

He describes post A by the number 4.

He describes post B by the number 5.

Draw a ring around the post he describes with the number 0.

Can George describe all the posts with whole numbers? _____

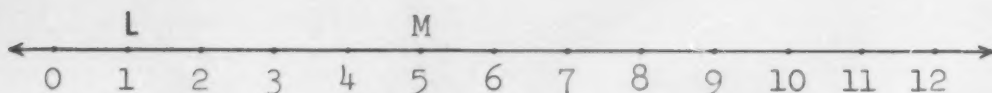
Sally does not like the way George describes the posts.

She says the numbers that describe A and B should be 6 and 7.

Put a cross on the post Sally describes by the number 0.

Can Sally describe all the posts by whole numbers? _____

2. Pretend this number line shows a railroad track.



A train is on the track.

Its ends are at L and M.

Color red the track where the train is standing.

Point L is described by the number _____.

Point M is described by the number _____.

The length of the train is _____ units.

The train moves 6 units to the right.

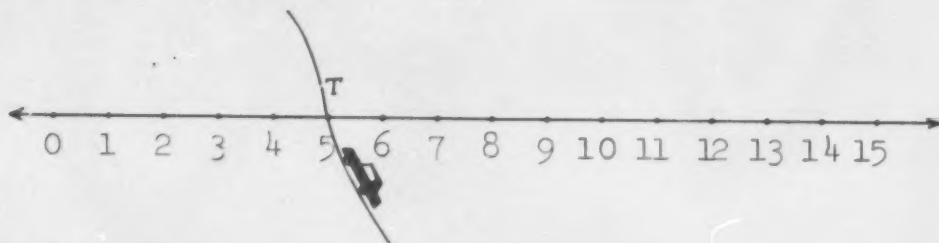
Call the new endpoints P and Q.

Point P is described by number _____.

Point Q is described by number _____.

Color green the track where the train is now.

3. Pretend the number line is a railroad track.



A train is on the track.

Its ends are described by numbers 2 and 9.

Color the track where the train is standing.

A road crosses the track at T.

A car is on the road.

Can the car cross the track? _____

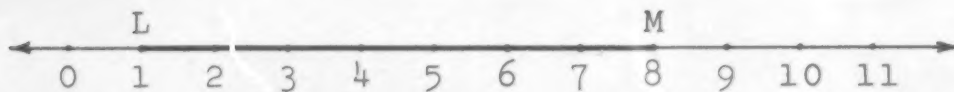
The train moves to the right.

The front of the train is described by the number 13.

The back of the train is described by the number _____.

Can the car now cross the track? _____

4. Pretend this number line shows a railroad track.



A train is on the track.

Its ends are at L and M.

A road crosses the track at a point X.

Point X is described by the number 51.

Can you imagine the point X? _____

The train moves 46 units to the right and stops.

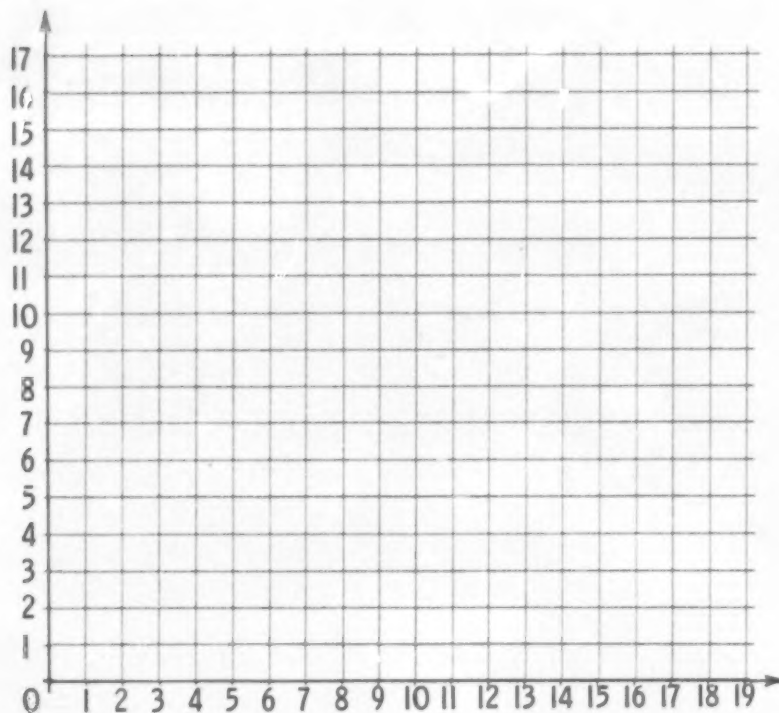
Its ends are described by the numbers _____ and _____.

Has the train crossed the road? _____

Coordinates in a Plane

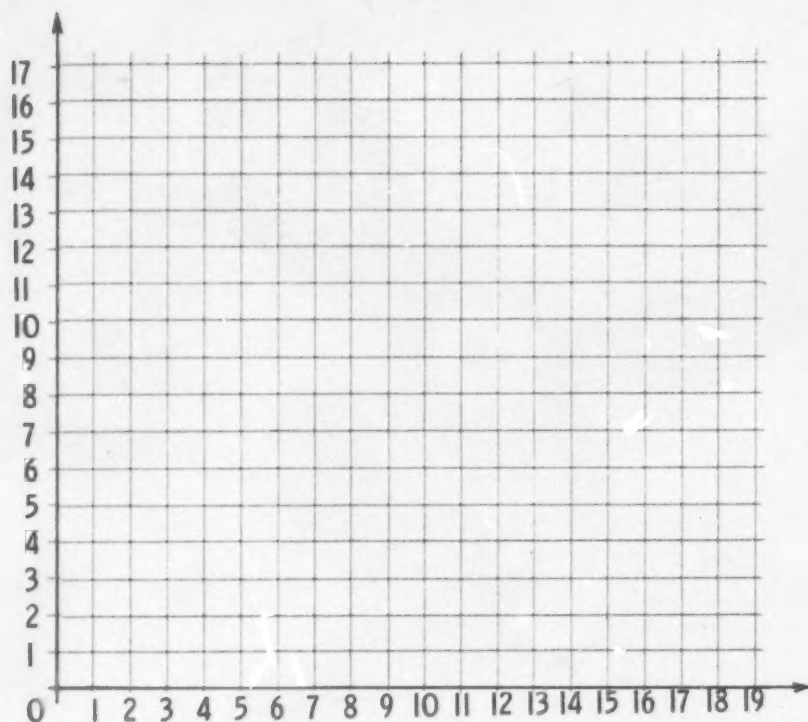
1. Draw segments joining the following points in order:

(10, 4) (11, 6) (12, 6) (12, 7) (11, 7) (12, 7) (12, 8)
(13, 8) (12, 10) (13, 11) (13, 12) (12, 13) (8, 13) (7, 12)
(7, 8) (8, 6) (8, 4).



What did you find? _____

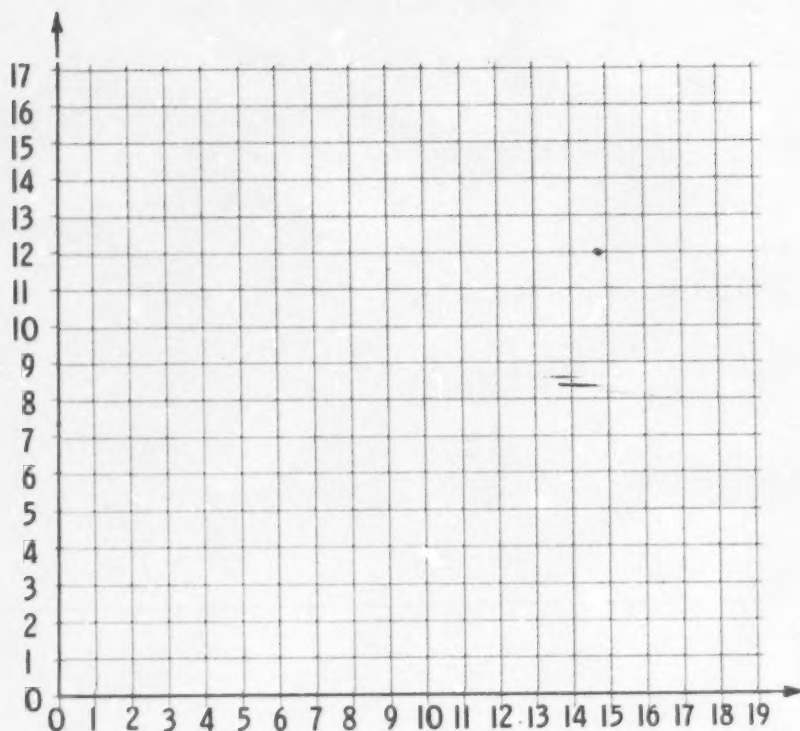
2.



Use your ruler to draw the line through the points $(6, 1)$ and $(2, 5)$.

Other points which seem to lie on this line are $(\quad, \quad)$, $(\quad, \quad)$,
 $(\quad, \quad)$, $(\quad, \quad)$, $(\quad, \quad)$, and $(\quad, \quad)$.

3.



Use your ruler to draw the line through the points $(4, 1)$ and $(12, 13)$.
Some other points which seem to lie on this line are $(,)$ and $(,)$,
also $(,)$ and $(,)$.

4. Draw segments joining the following points in order :

(2, 13) (2, 9) (2, 11) (4, 11) (4, 9) (4, 13).

Draw segments joining the following points in order :

(7, 12) (5, 12) (5, 10) (6, 10) (5, 10) (5, 8) (7, 8).

Draw segments joining the following points in order:

(8, 11) (8, 7) (10, 7).

Draw segments joining the following points in order:

(13, 6) (11, 6) (11, 10).

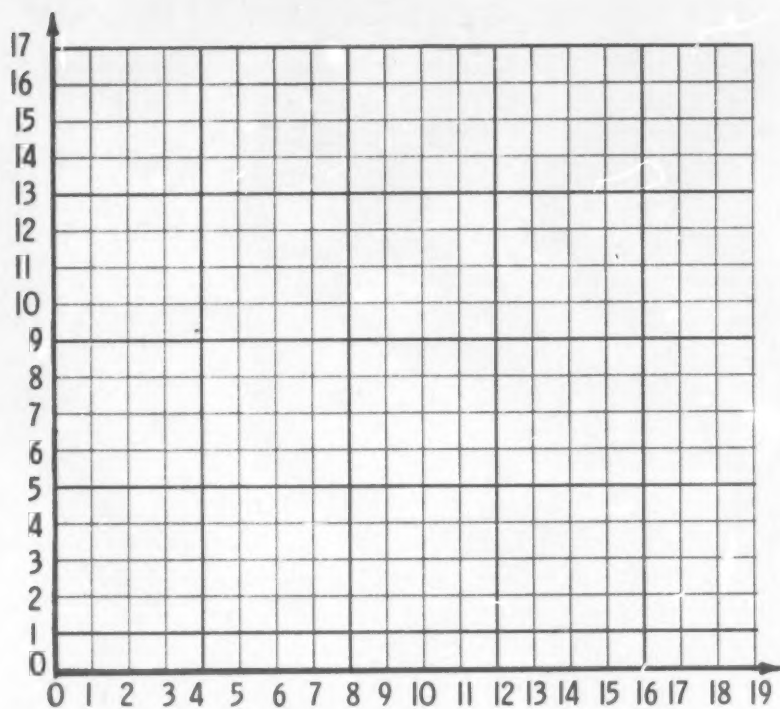
Draw segments joining the following points in order:

(15, 5) (16, 5) (17, 6) (17, 8) (16, 9) (15, 9)

(14, 8) (14, 6) (15, 5).

What did you find? _____

4.



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5. Give numbers describing A, B, C, D.

A(,), B(,), C(,), D(,).

Draw $\overline{AC}$ and $\overline{BD}$. Call their point of intersection E.

Give numbers describing E. (,)

The length of $\overline{BD}$ is _____ units.

Draw $\overrightarrow{AD}$ and $\overrightarrow{BC}$.

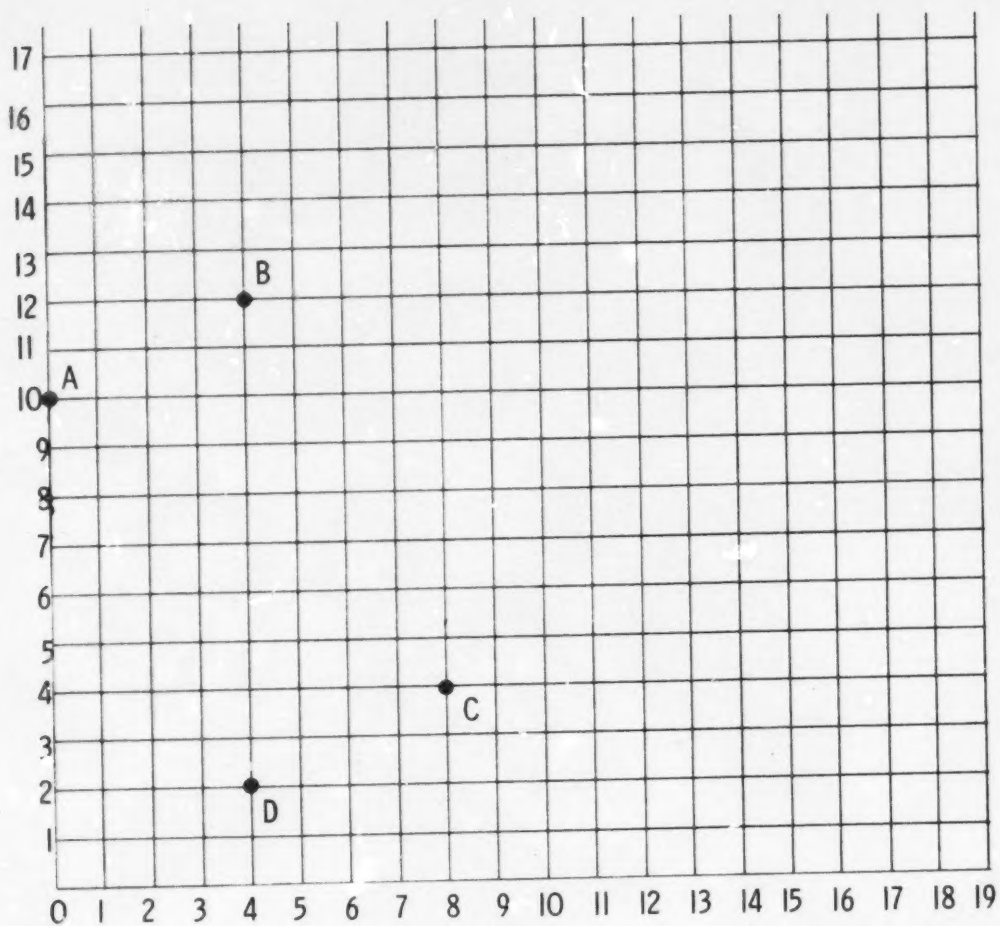
Give numbers describing the points where $\overrightarrow{AD}$ and $\overrightarrow{BC}$
meet the bottom line. (,) (,)

Draw $\overline{AB}$ and $\overline{CD}$. What kind of figure is ABCD? _____

Draw $\overleftrightarrow{CD}$.

Give numbers describing the point where $\overleftrightarrow{CD}$ meets the
bottom line. (,).

5.



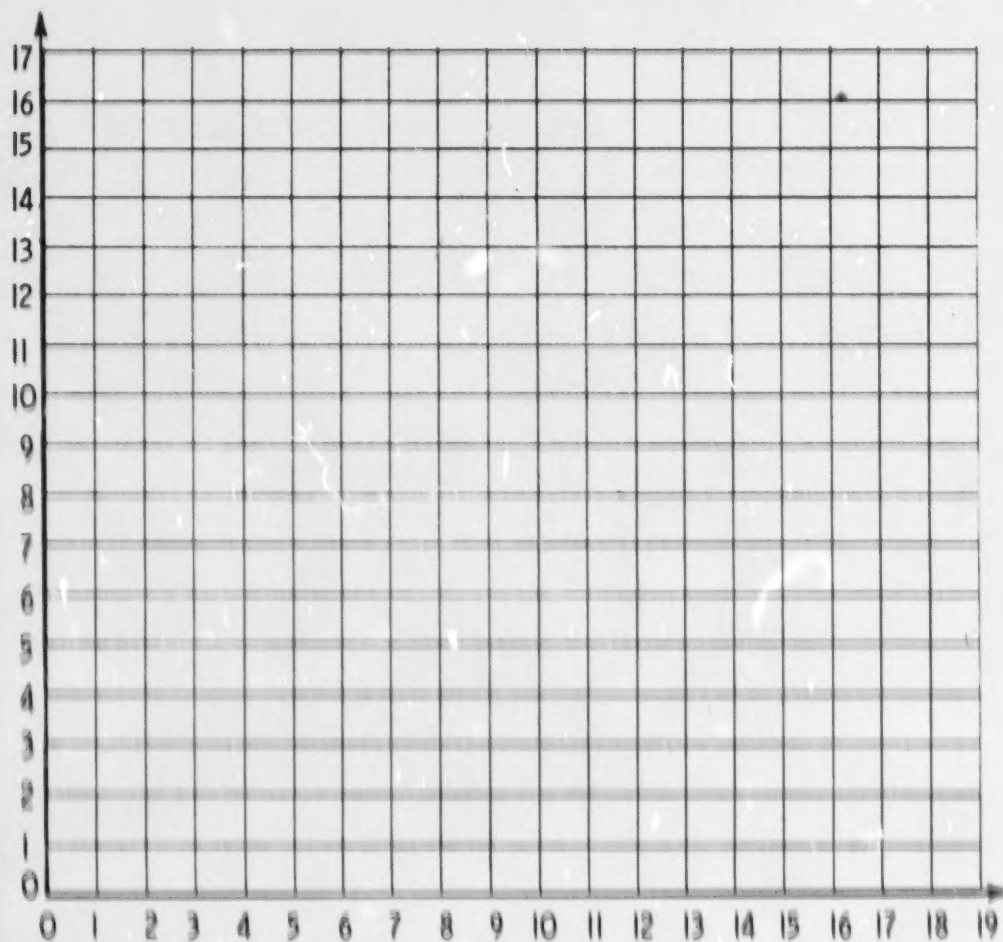
6. Make a figure on the facing page.

Use only segments whose endpoints are described by whole numbers.

Use the numbers to tell how to draw your figure.

See if a classmate can follow your directions without seeing your figure.

6.



Pictures in the Plane

A. Look at the figure on the next page.

The numbers describing A , B , C are

$A(\quad , \quad)$, $B(\quad , \quad)$, $C(\quad , \quad)$.

Move 7 units to the right and 4 units up from each point.

Call these new points P , Q , R .

The numbers describing P , Q , R are

$P(\quad , \quad)$, $Q(\quad , \quad)$, $R(\quad , \quad)$.

Mark P , Q , R .

Draw $\overline{PQ}$, $\overline{QR}$, and $\overline{RP}$.

Make a tracing of $\triangle ABC$.

Does this tracing exactly fit on $\triangle PQR$?

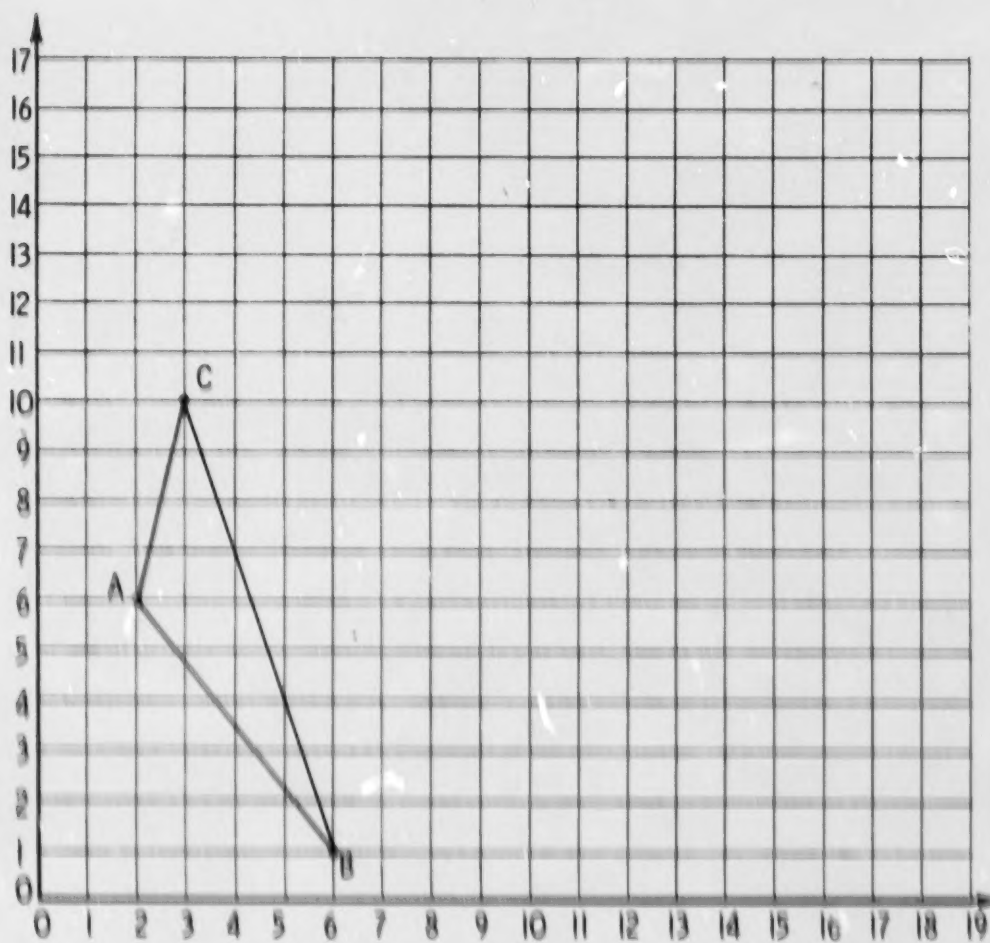
Do you find $\triangle ABC$ congruent to $\triangle PQR$?

Complete the table below to show congruent sides and angles.

$\overline{AB}$	
$\overline{BC}$	
	$\overline{PR}$
$\angle ABC$	
	$\angle RPQ$
$\angle BCA$	

Pictures in the Plane

A.



Pictures in the Plane

1. The pairs of numbers describing A, B, C, D are
 $A(2, 12)$ $B(0, 7)$ $C(7, 3)$ $D(5, 9)$.

Points P, Q, R, S are found by adding 5 to the first number in each pair.

The second numbers are not changed.

The pairs of numbers describing P, Q, R, S are
 $P(,)$, $Q(,)$, $R(,)$, $S(,)$.

Mark A, B, C, D, P, Q, R, S on the opposite page.

Draw quadrilateral ABCD.

Draw quadrilateral PQRS.

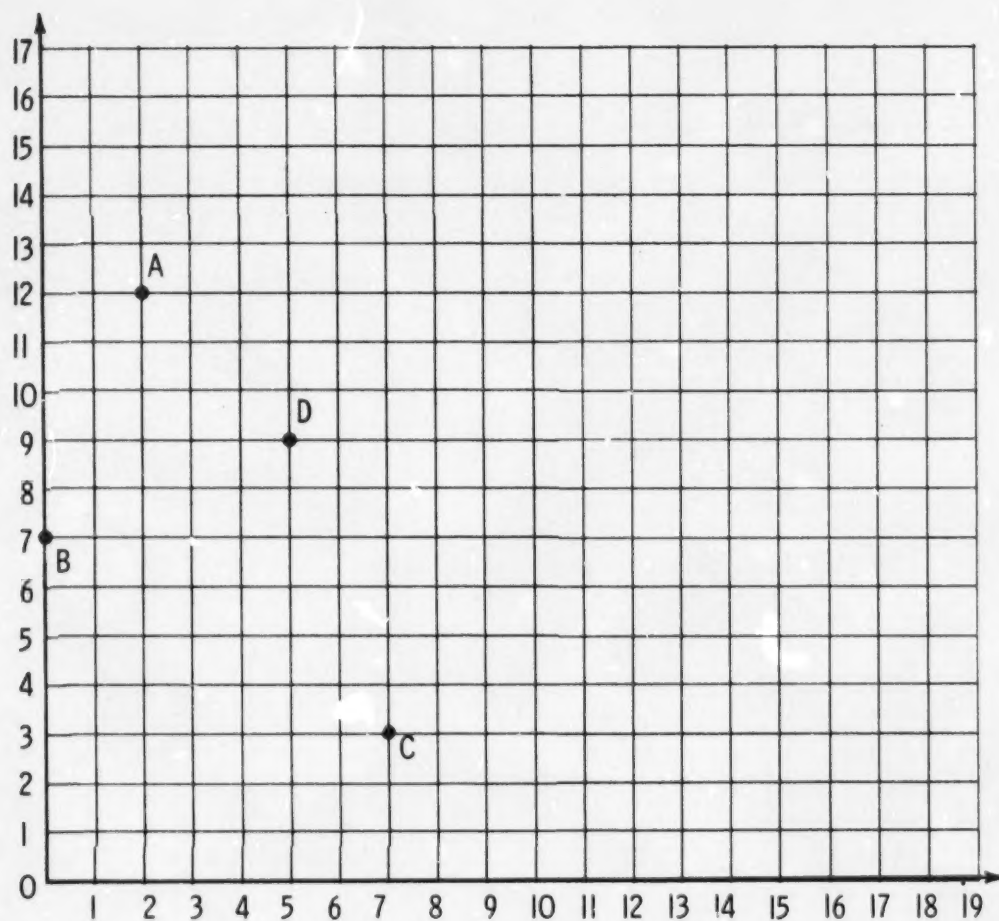
Make a tracing of ABCD.

Can you fit the tracing on PQRS? _____

Is ABCD congruent to PQRS? _____

Pictures in the Plane

1.



2. The pairs of numbers describing A, B, C, D, E are
A(1, 9) B(5, 7) C(2, 2) D(11, 1) E(6, 13).

Points P, Q, R, S, T are found by adding 6 to the first number in each pair and 2 to the second number.

The pairs of numbers describing P, Q, R, S, T are
P(,), Q(,), R(,),
S(,), T(,).

Mark all these points on the opposite page.

Draw $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, $\overline{DE}$, $\overline{EA}$.

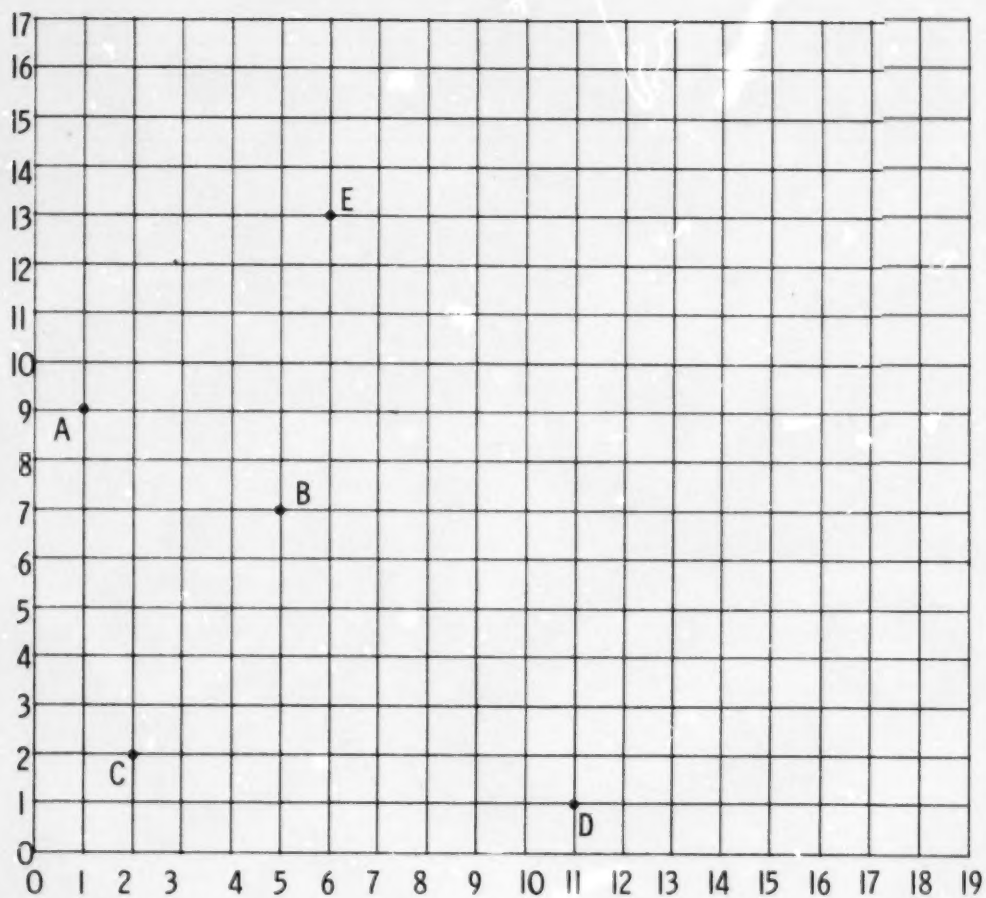
Draw $\overline{PQ}$, $\overline{QR}$, $\overline{RS}$, $\overline{ST}$, $\overline{TP}$.

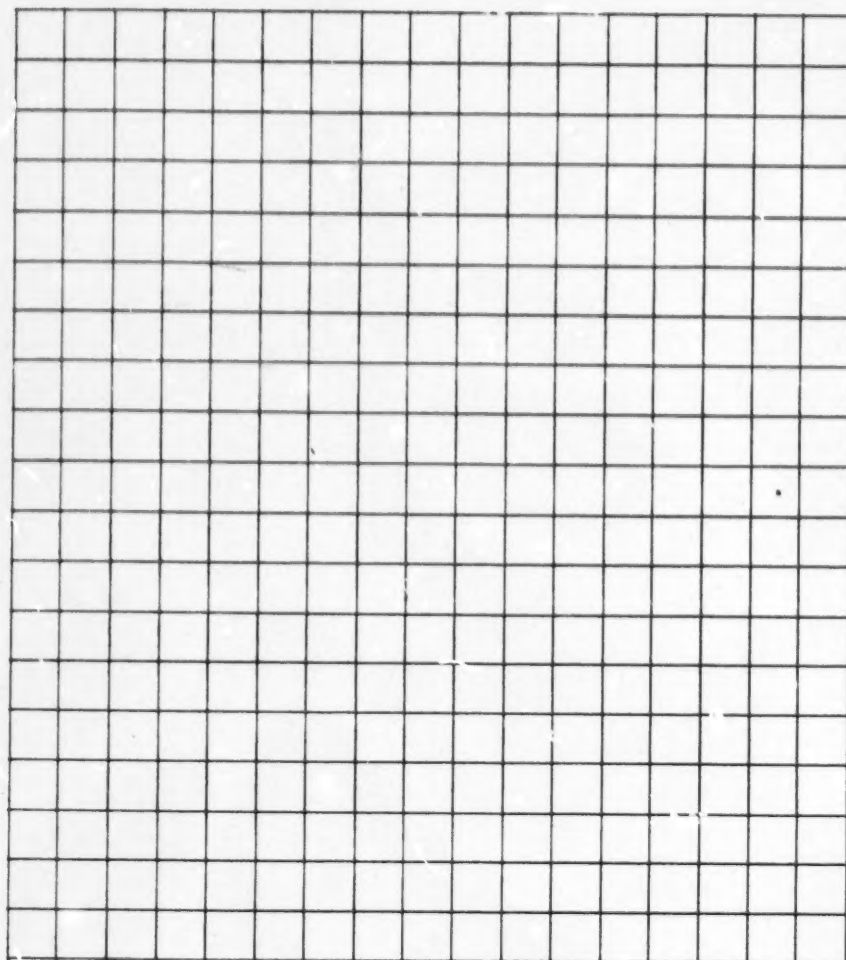
Make a tracing of ABCDE.

Can you fit the tracing on PQRST? _____

Is ABCDE congruent to PQRST? _____

2.



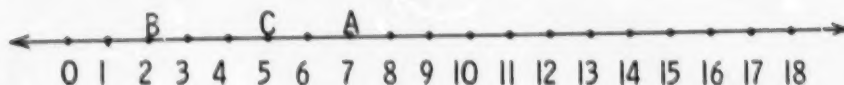


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Enlarging Segments on the Number Line.

- Points A, B, C are shown on the number line.



The number describing point P is two times the number for A.

The number describing point Q is two times the number for B.

The number describing point R is two times the number for C.

Mark points P, Q, R on the line.

Show below the number describing each point.

A	B	C	P	Q	R

Show below the number of units in each segment.

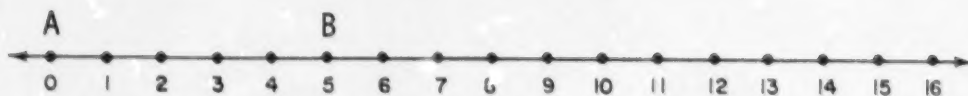
$\overline{AB}$	$\overline{BC}$	$\overline{AC}$	$\overline{PQ}$	$\overline{QR}$	$\overline{PR}$

Is $\overline{PQ}$ twice as long as $\overline{AB}$? _____

Is $\overline{QR}$ twice as long as $\overline{BC}$? _____

Is $\overline{PR}$ twice as long as $\overline{AC}$? _____

2. Look at the number line.



Color $\overline{AB}$ with a red crayon.

Multiply the numbers describing A and B by 3.

These new numbers are _____, _____.

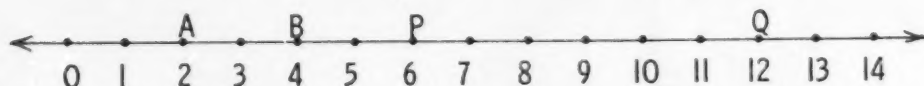
Call the new points P and Q.

Mark P and Q on the line.

Color $\overline{PQ}$ with a blue crayon.

The length of $\overline{PQ}$ is _____ times the length of $\overline{AB}$.

3. Look at the number line.

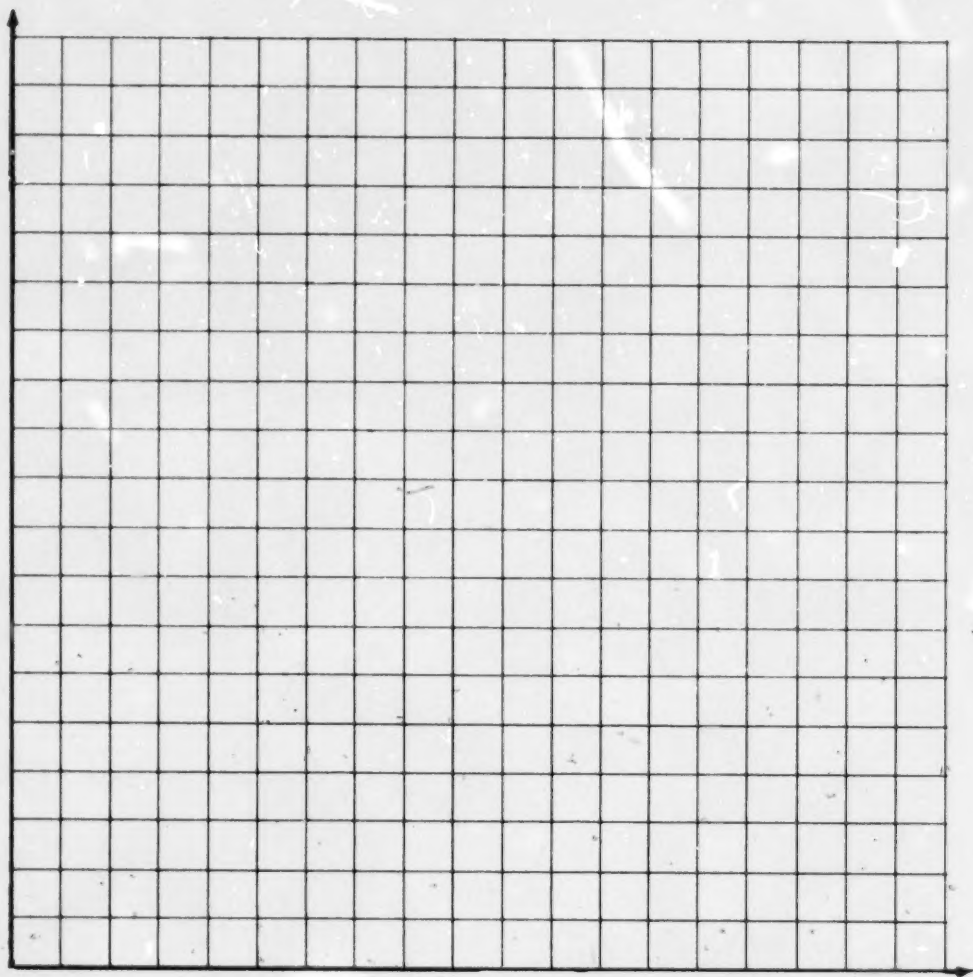


The number describing P is _____ times the number describing A.

The number describing Q is _____ times the number describing B.

The length of $\overline{PQ}$ is _____ times the length of $\overline{AB}$.

Are the three numbers you wrote in the blanks the same? _____



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Enlarging Pictures

A. Look at the figure on page 201.

The coordinates of A, B, C are

A(,), B(,), C(,).

Multiply all the numbers by 2.

Call the new points S, T, W.

The coordinates of S, T, W are

S(,), T(,), W(,).

Mark the points S, T, W.

Draw $\triangle STW$.

Draw a ring around each correct answer below.

Is $\overline{ST}$ twice as long as $\overline{AB}$? Yes No

Tell how you found out.

Is $\overline{SW}$ twice as long as $\overline{AC}$? Yes No

Is $\overline{WT}$ twice as long as $\overline{CB}$? Yes No

Make a tracing of $\triangle ABC$.

Is $\triangle ABC$ congruent to $\triangle STW$? Yes No

Is $\angle TSW$ congruent to $\angle BAC$? Yes No

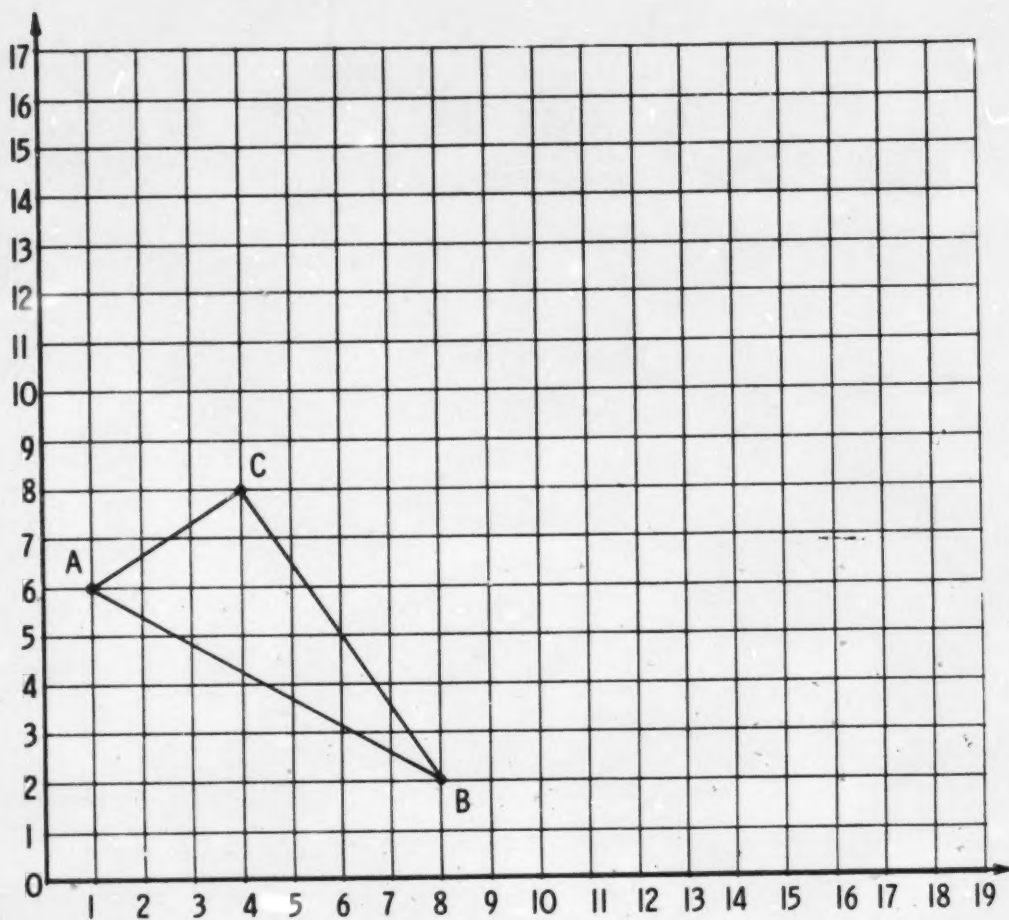
Use the tracing to check.

Name the angle congruent to $\angle ABC$. _____

Name the angle congruent to $\angle TWS$. _____

Enlarging Pictures

A.



B. Look at quadrilateral ABCD.

Multiply all coordinates of these points by 3.

Call the new points P, Q, R, S.

The coordinates of P, Q, R, S are

P(,), Q(,), R(,), S(,).

Locate points P, Q, R, S.

Draw quadrilateral PQRS.

Is $\overline{PQ}$ three times as long as $\overline{AB}$? Yes No

Is $\overline{QR}$ three times as long as $\overline{BC}$? Yes No

Is $\overline{RS}$ three times as long as $\overline{CD}$? Yes No

Is $\overline{PS}$ three times as long as $\overline{AD}$? Yes No

Make a tracing of ABCD.

Is the angle at A congruent to the angle at P? Yes No

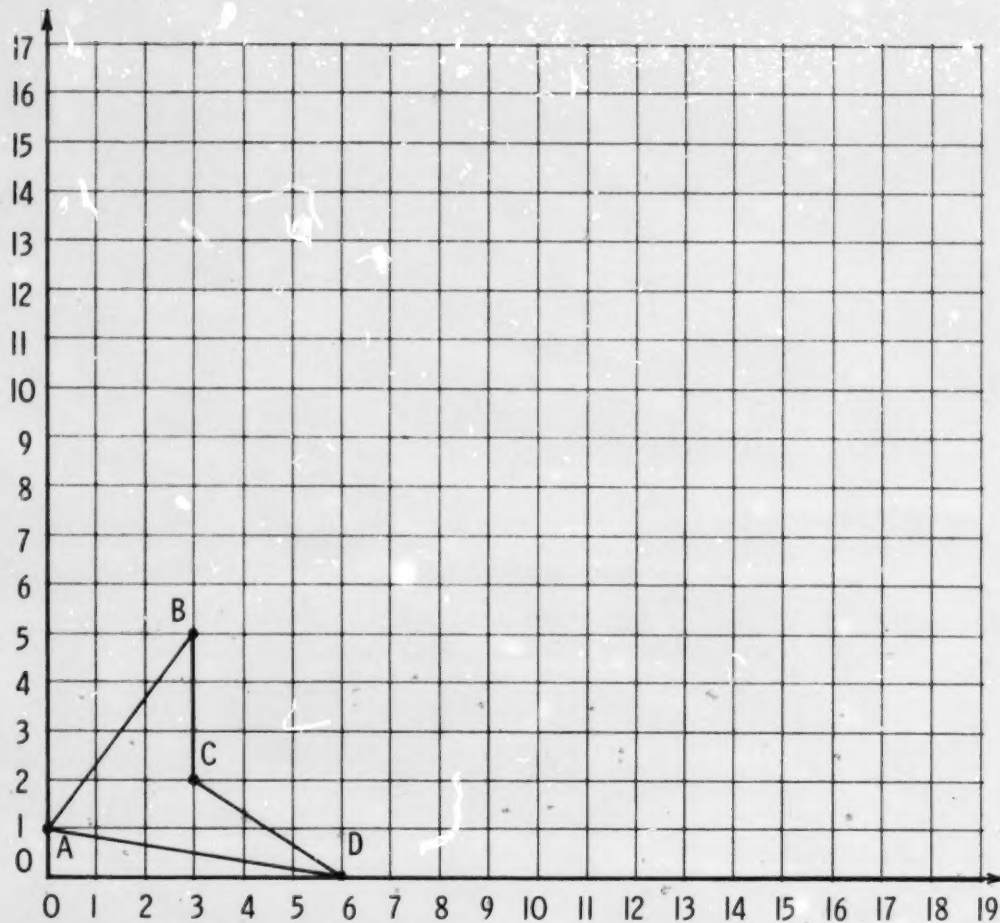
Use the tracing to find out.

The angle at B is congruent to the angle at _____.

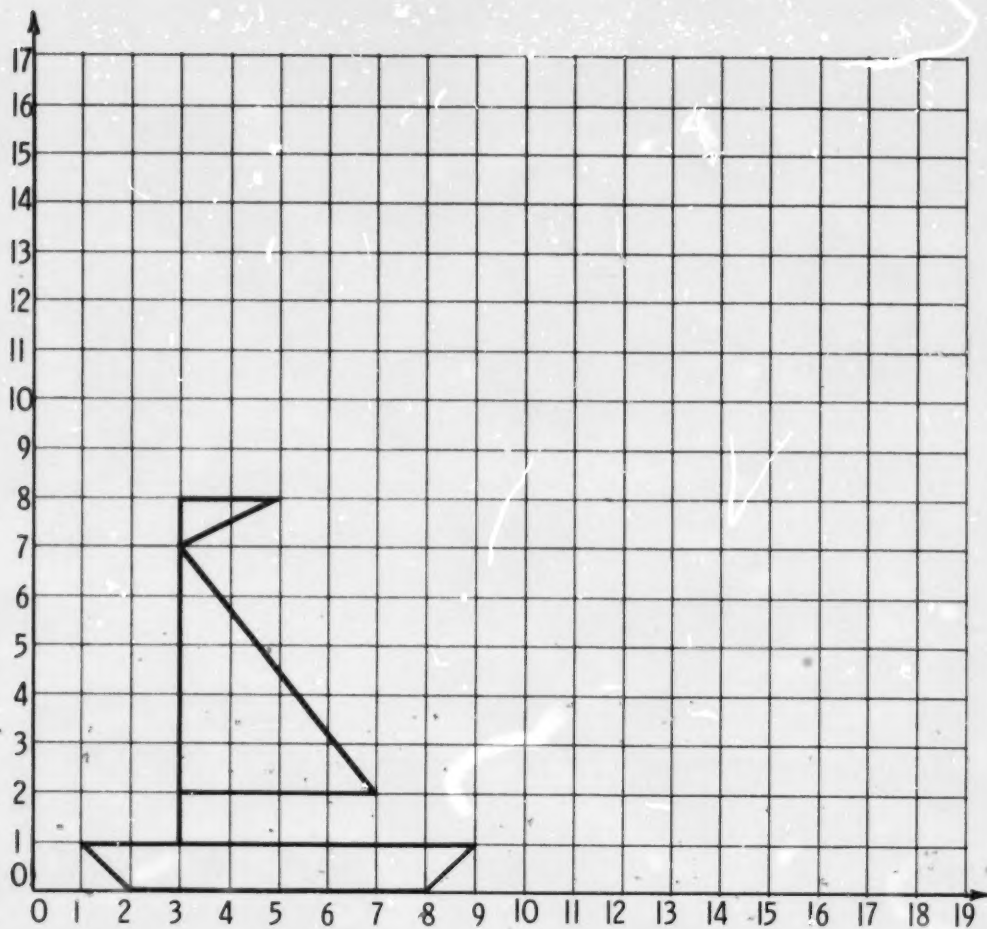
The angle at S is congruent to the angle at _____.

The angle at R is congruent to the angle at _____.

B.



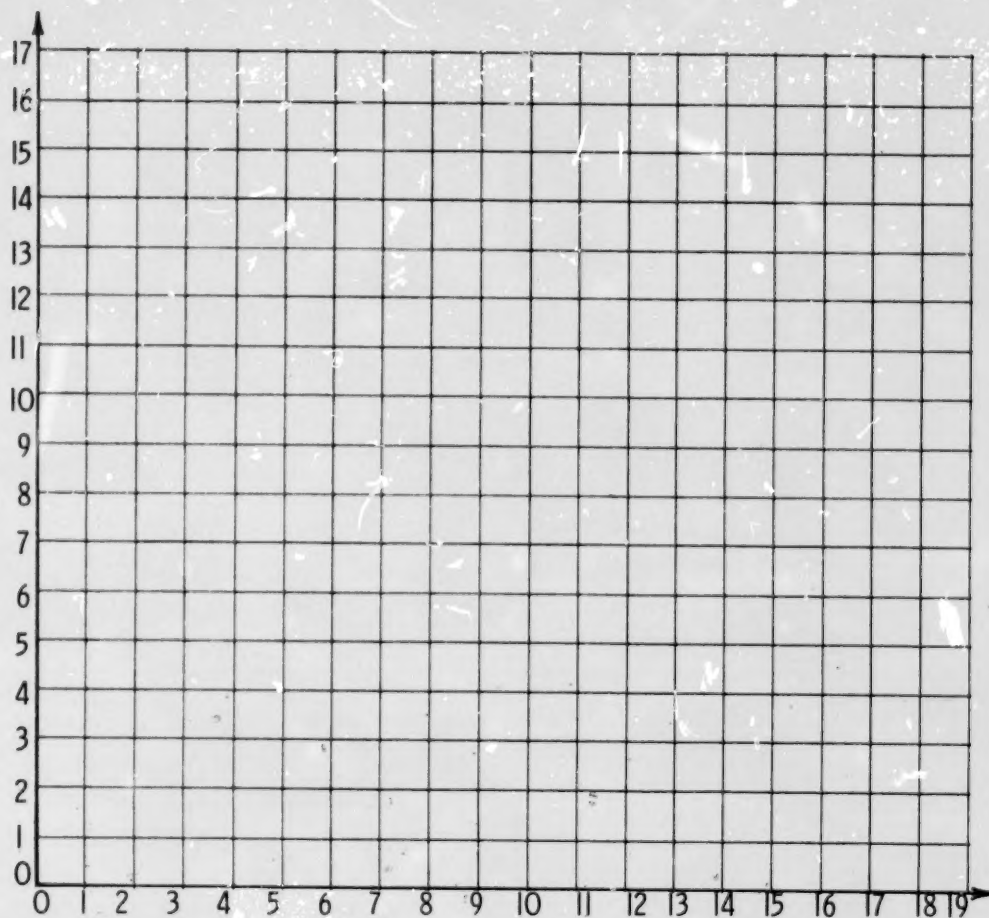
C.



Make a larger picture of the boat on the facing page.

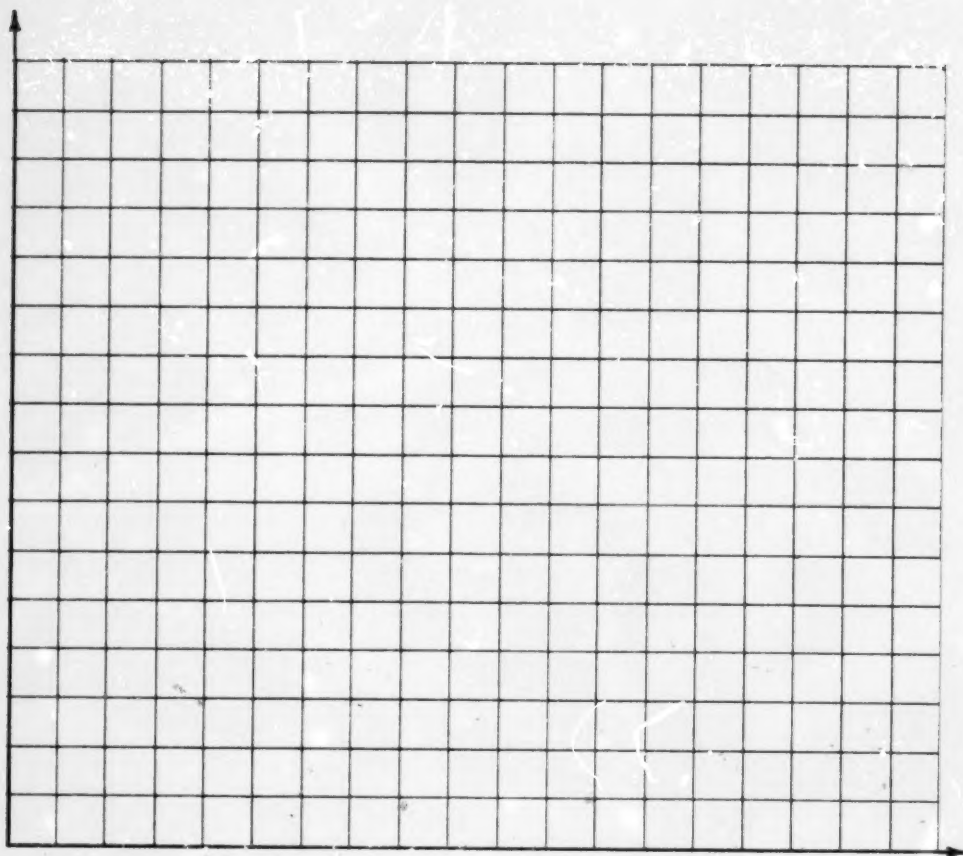
Multiply all coordinates by 2.

C.



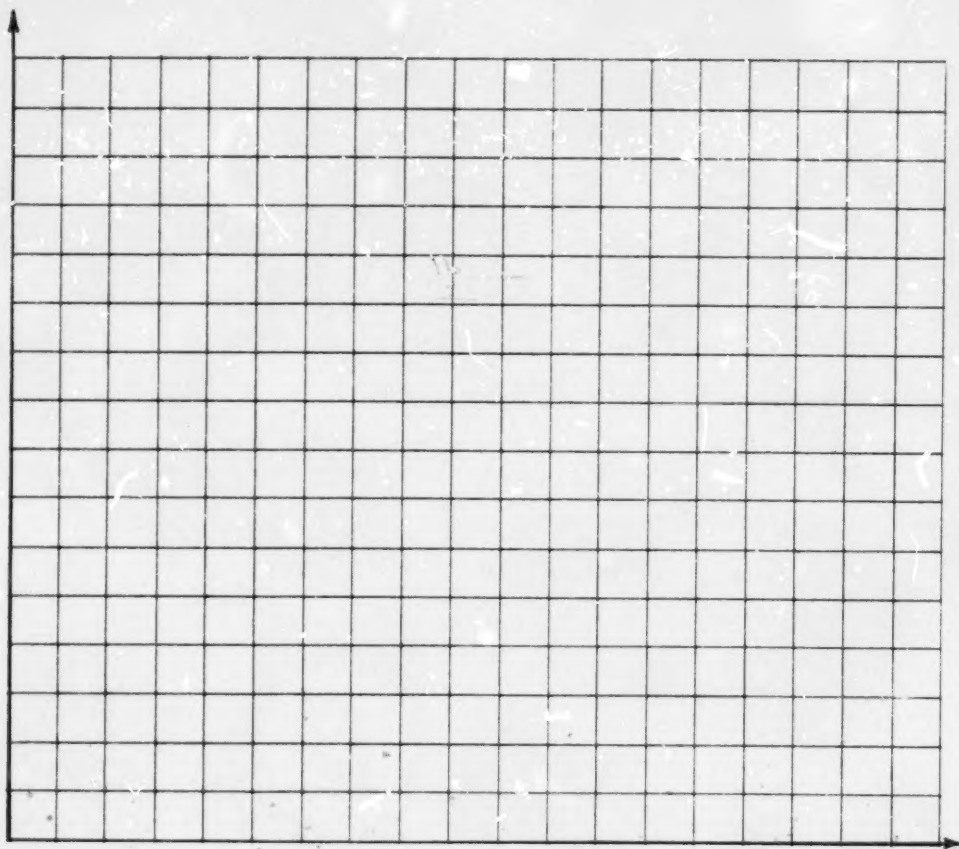
205

211



206

212



207

213

Reading Scale Drawings

1. Look at the figure on the facing page.

ABCD is a scale drawing of the floor of a room.

PQRS shows a table in this room.

See the scale below the picture.

Each small segment of this scale shows a one-foot segment in the room.

Lay off this scale on the edge of a piece of paper.

Lay it off several times to make a scale at least 20 units long.

2. Use the scale to find the following distances in the room
(to the nearest foot).

Length of longer side _____ ft.

Length of shorter side _____ ft.

Longer side of table _____ ft.

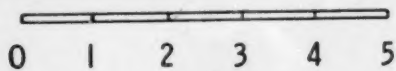
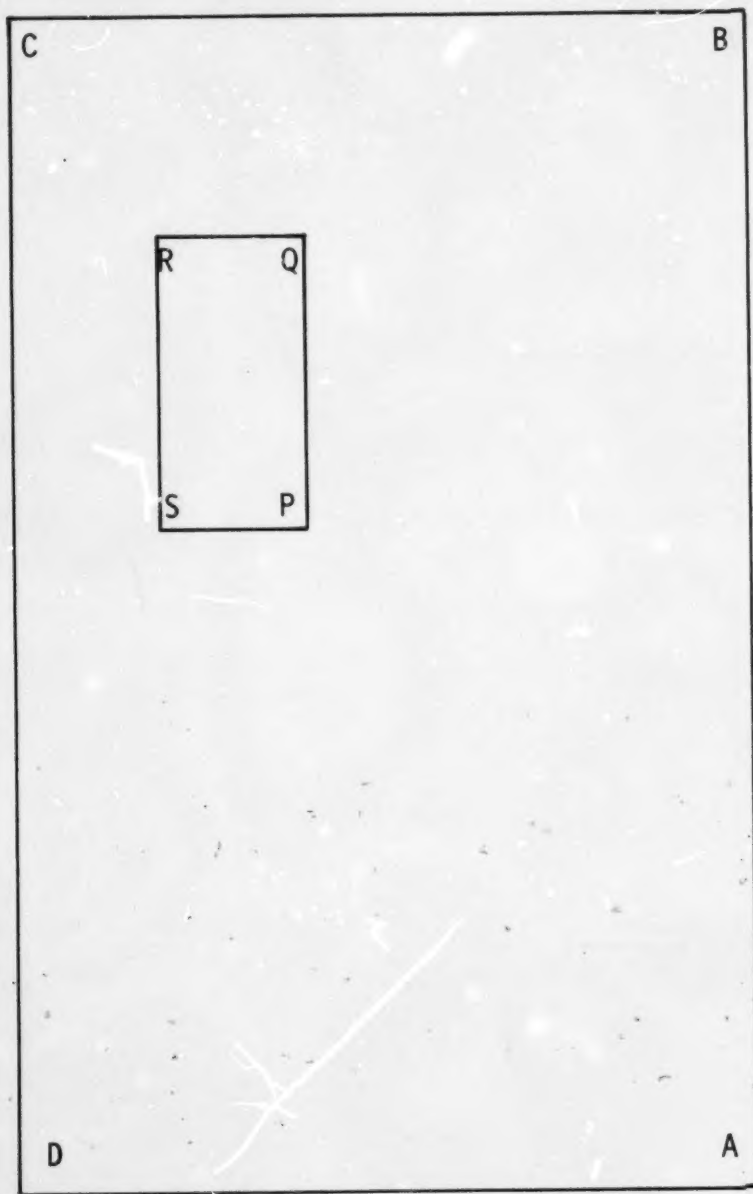
Shorter side of table _____ ft.

Distance matching $\overline{DB}$ _____ ft.

Distance from the point matching C to nearest corner of the table
_____ ft.

Distance from the point matching C to farthest corner of the table
_____ ft.

Reading Scale Drawings



Look at the figure on the facing page.

It is part of a map.

See the scale below the map.

Each little segment on this scale stands for one mile.

Find the following distances:

Shortest distance from Madison to Conway is _____ miles.

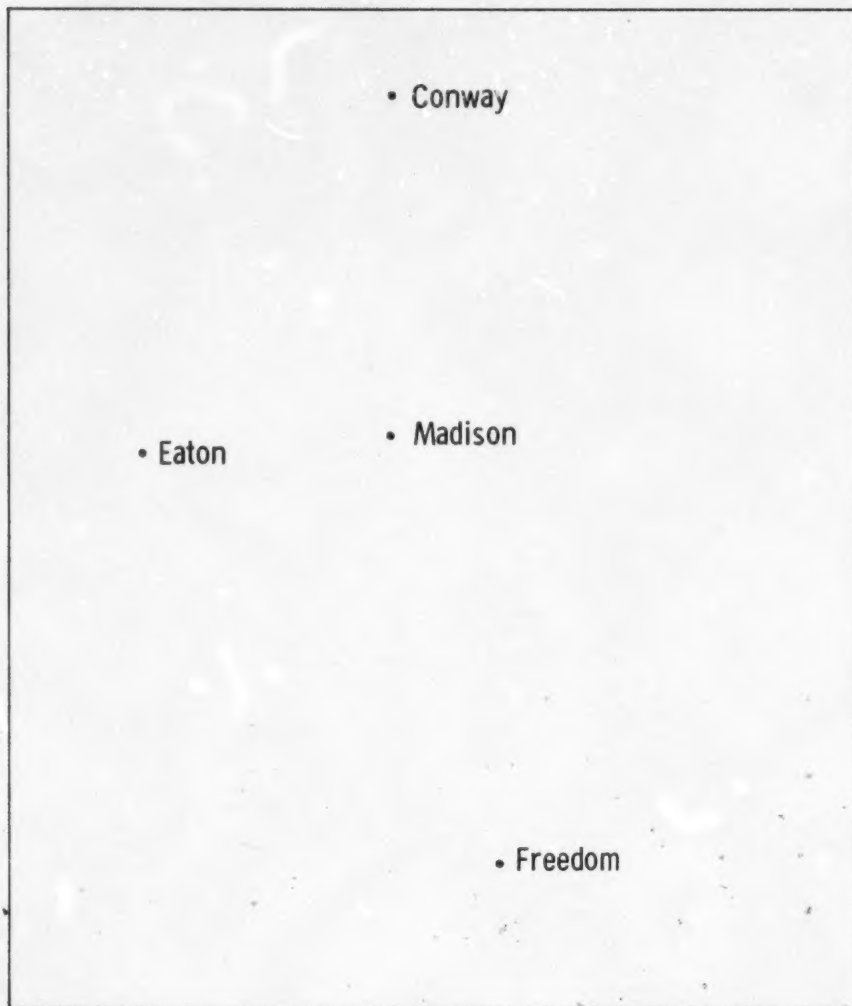
Shortest distance from Madison to Eaton is _____ miles.

Shortest distance from Madison to Freedom is _____ miles.

Shortest distance between Freedom and Eaton is _____ miles.

Shortest distance from Eaton to Madison to Freedom to Eaton is _____ miles.

Distance from Conway to Eaton to Madison to Freedom is _____ miles.

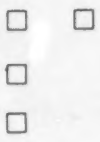
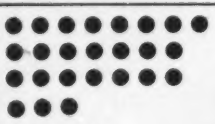


0 1 2 3 4 5

Scale of miles

Arrays

In the pictures below rearrange the objects to form an array. Write in the blanks the number of rows in your array and the number of objects in each row.

	_____ by _____		_____ by _____
	_____ by _____		_____ by _____
	_____ by _____		_____ by _____
	_____ by _____		_____ by _____

The Number of Elements in an Array

Draw an array, then fill in the blank.

A 5 by 3 array has _____ elements.

A 4 by 4 array has _____ elements.

A 7 by 3 array has _____ elements.

A 4 by 6 array has _____ elements.

A 4 by 9 array has _____ elements.

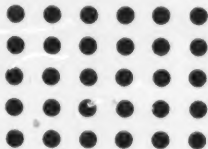
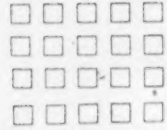
An 8 by 3 array has _____ elements.

A 3 by 6 array has _____ elements.

An 8 by 5 array has _____ elements.

Arrays and Equations

Match the array with the equation that describes it.

A 	B 	C 
D 	E 	F 
G 	H 	I 

- | | |
|-------------------------------|----------------------------|
| 1) $8 + 8 + 8 + 8 = 32$ _____ | 5) $5 \times 6 = 30$ _____ |
| 2) $6 \times 4 = 24$ _____ | 6) $5 \times 7 = 35$ _____ |
| 3) $4 \times 5 = 20$ _____ | 7) $7 + 7 + 7 = 21$ _____ |
| 4) $3 + 3 + 3 + 3 = 12$ _____ | 8) $5 \times 3 = 15$ _____ |
| | 9) $8 \times 2 = 16$ _____ |

Multiplication Equations

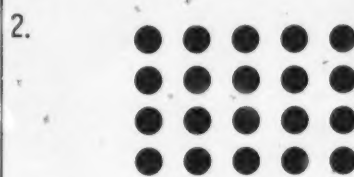
Fill in the blanks:



Equation: _____

Product: _____

Factors: _____



Equation: _____

Product: _____

Factors: _____



Equation: _____

Product: _____

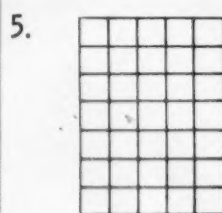
Factors: _____



Equation: _____

Product: _____

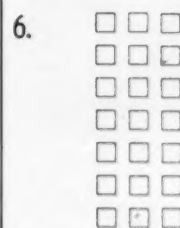
Factors: _____



Equation: _____

Product: _____

Factors: _____



Equation: _____

Product: _____

Factors: _____

7.

.....

Equation: _____

Product: _____

Factors: _____

8.

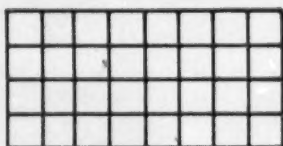


Equation: _____

Product: _____

Factors: _____

9.

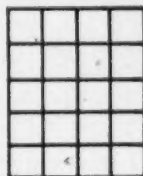


Equation: _____

Product: _____

Factors: _____

10.



Equation: _____

Product: _____

Factors: _____

11.

a	b	c	d
e	f	g	h
i	j	k	l

Equation: _____

Product: _____

Factors: _____

12.

b	a	d	c
f	e	h	g
j	i	k	l

Equation: _____

Product: _____

Factors: _____

A Multiplication Table

Write the product for each pair of factors, for example, $2 \times 6 = 12$,
and $6 \times 2 = 12$.

$\times$	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6			12							
7										
8										
9										

Zero or One as a Factor

Write the products.

$5 \times 0 =$

$1 \times 9 =$ _____

$0 \times 5 =$

$9 \times 1 =$

$0 \times 0 =$

$1 \times 89 =$

$$0 \times 641 =$$

$$1 \times \quad = 13$$

$$0 \times n =$$

$$\times 17 = 17$$

$$1,240 \times \quad = 0$$

$$n \times 1 =$$

How would you complete these equations?

$$\times 0 = 2$$

$$0 \times \quad = 7$$

If zero is a factor, what is the product? _____

If one is a factor, what is the product?

Other Factors

1. Start at 0 and count to 18 by 2's.

2. What row in your chart looks like your answer to question 1?

_____ What column? _____

3. Start at 0 and count to 18 by 3's.

4. What row in your chart looks like your answer to question 3?

_____ What column? _____

5. Start at 0 and count to 18 by 4's.

6. What row in your chart looks like your answer to question 5?

_____ What column? _____

7. How can you tell just by looking at a product that it has 5 as a factor? _____

8. Why is there a row and a column that look like counting from 0 to 18 by 6's? _____

9. How many products appear in your chart only once? _____
Why? _____

Prime Numbers and Products of Primes

Suppose you want to arrange a set of objects in an array. You can always make an array with just one row like this:

0 0 0 0 0 0 0 0 0

or just one object in each row like this:

0
0
0
0
0
0
0
0
0

But can you always make an array with more than one row and more than one object in each row? Let's see. Can you do it with 12 objects? _____

If you can, draw the array here:

Can you do it with 9 objects? _____ If you can, draw the array here:

Can you do it with 11 objects? _____ If you can, draw the array here:

Now try it for all the numbers listed below. For each number try to make an array with more than one row and more than one object in each row. If you can do it, draw the array. If you can't do it, put an X in the blank by the number.

2 _____

11 _____

3 _____

12 _____

4 _____

13 _____

5 _____

14 _____

6 _____

15 _____

7 _____

16 _____

8 _____

17 _____

9 _____

18 _____

10 _____

19 _____

20 _____

The numbers you have marked with X are called prime numbers. As you go higher, the prime numbers get scarcer, but no matter how high you go there are always more prime numbers farther on. The set of prime numbers forms a mysterious and irregular-looking pattern.

These numbers are called multiples of 2:

2, 4, 6, 8, 10, 12, ...

These numbers are called multiples of 3:

3, 6, 9, 12, 15, 18, 21, ...

Write here the first ten multiples of 5:

What special name do we have for the multiples of 2? _____

Every number is a multiple of 1, and every number is a multiple of itself.

In the list below put a 1 next to every multiple of 1, put a 2 next to every multiple of 2, put a 3 next to every multiple of 3, and so forth as far as you can go.

2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____
9 _____

10 _____
11 _____
12 _____
13 _____
14 _____
15 _____
16 _____
17 _____

18 _____

20 _____

19 _____

21 _____

...

(The three dots after 21 show that you could go on and on.)

How many numbers is 8 a multiple of? _____

What is the smallest number that is a multiple of six numbers? _____

What is the smallest number that is a multiple of exactly five numbers? _____

Write Prime next to each number that is a multiple of no number except itself and 1. Does this check with the prime numbers you found using arrays? _____ If not, go back and check your work.

Do you remember what product means? What is the product of 2 and 5? _____

Every whole number greater than 1 is either a prime number or can be written as a product of prime numbers. Write each of the following numbers as a product of prime numbers. Be careful to use only prime numbers. Some of them are done for you.

2

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2 prime	12 _____	22 _____
3 prime	13 prime	23 prime
4 = 2×2	14 _____	24 _____
5 prime	15 _____	25 _____
6 = 2×3	16 _____	26 _____
7 prime	17 prime	27 _____
8 = $2 \times 2 \times 2$	18 _____	28 _____
9 _____	19 prime	29 prime
10 _____	20 _____	30 _____
11 prime	21 _____	31 prime

Is this equation correct? _____

$$2 \times 3 \times 5 = 30$$

How many numbers is 30 a multiple of? _____

How many different arrays could you make with 30 objects? _____

How many different arrays could you make with 100 objects? _____

★ Square and Triangular Arrays.

1. 3×3 is sometimes called the "square of 3." Can you think why?

It can be represented by a square array.

Write the squares of the first six numbers and draw an array for each one.

$1 \times 1 = \underline{\quad}$

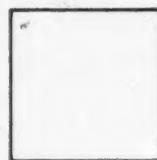
$2 \times 2 = \underline{\quad}$

$3 \times 3 = \underline{\quad}$

$4 \times 4 = \underline{\quad}$

$5 \times 5 = \underline{\quad}$

$6 \times 6 = \underline{\quad}$



2. Now do these additions:

$1 = \underline{\quad}$

$1 + 3 = \underline{\quad}$

$1 + 3 + 5 = \underline{\quad}$

$1 + 3 + 5 + 7 = \underline{\quad}$

$1 + 3 + 5 + 7 + 9 = \underline{\quad}$

$1 + 3 + 5 + 7 + 9 + 11 = \underline{\quad}$

3. Compare the answers you got in problems 1 and 2. What do you notice?

4. Here is a dot.



Make a 2×2 array by putting in more dots. How many more dots did you have to put in? _____

Now make it into a 3×3 array. How many more dots did you need? _____

Now make it into a 4×4 array. How many more dots did you need? _____

Now make it into a 5×5 array. How many more dots did you need? _____

Now make it into a 6×6 array. How many more dots did you need? _____

5. Now look back at problems 1 and 2. Can you explain, using what you found out in problem 4, why you got the same answers to both problems 1 and 2? _____

6. The numbers 1, 4, 9, 16, 25, 36, ... etc., are called the square numbers. They are the numbers of things in square arrays. There is another set of numbers called the triangle numbers. These are the numbers of things in triangular arrays. Here are the first few triangle numbers with their arrays:

1

3

6

10

7. Do these additions:

1 = _____

 $1 + 2 =$ $1 + 2 + 3 =$ $1 + 2 + 3 + 4 =$
$$1 + 2 + 3 + 4 + 5 = \underline{\hspace{2cm}}$$
$$1 + 2 + 3 + 4 + 5 + 6 = \underline{\hspace{2cm}}$$

Did you get the triangle numbers?

Explain why.

8. Here are the first few triangle numbers:

1, 3, 6, 10, 15, 21, 28, ...

Let's add them in pairs.

$$1 + 3 = \underline{\quad}$$

$$3 + 6 = \underline{\quad}$$

$$6 + 10 = \underline{\quad}$$

$$10 + 15 = \underline{\quad}$$

$$15 + 21 = \underline{\quad}$$

$$21 + 28 = \underline{\quad}$$

What numbers did you get? Can you explain why?

Hint: Try to fit two triangular arrays together.

★ Multiplying and Adding

1. Here are two sets of numbers:

Set A: 2, 3, 5

Set B: 4, 6

Write down all the pairs of numbers you can make taking the first number from Set A and the second from Set B.

We can show the set of number pairs you have just written by means of an array:

		Set B	
		4	6
Set A	2	.	.
	3	.	.
	5	.	.

Each dot in the array stands for one of the possible number pairs.

Compare your list of pairs with the array. Do they check? _____

2. Multiply each pair of numbers in your list and put the product into this array. The product of 6 and 3 has been put in for you to show you where it goes.

		Set B	
		4	6
Set A	2		
	3		18
	5		

3. Add up the six numbers inside the array and put their sum in this box:

We will come back to this number.

4. Find the sum of the numbers in Set A: $2 + 3 + 5 = \underline{\quad}$
 And in Set B: $4 + 6 = \underline{\quad}$
5. Multiply these two sums together and put the product in this box:

6. Now look at the numbers you have in the two boxes (problems 3 and 5). Are they the same? If they are not, go back and check your work. The two numbers should be the same. To see why, look at this array.

	4	6
2	••••	••••••
3	•••••	•••••••
5	••••••	••••••••

231

236

How many dots are there in each of the rectangular pieces of the array?

How many dots are there in the whole array? _____

Now explain why you got the same number in problems 3 and 5.

7. Fill in this array with the products of the numbers in Set A with those in Set B. One product has been put in for you.

		Set B		
		1	4	3
Set A	2			
	5		20	
	3			

What is the sum of the numbers inside the array? _____

Could you have found this out without actually filling in the array? _____ How? _____

8. What is 13×13 ? _____

Here is a way to find 13×13 using what we have learned. Fill in this array with the products as before:

		10	3
10			
3			

232

237

What is the sum of the numbers you put in the array? _____

Is this sum equal to 13×13 ? _____

Why? _____

9. Use arrays to find these products:

$$11 \times 11 = \underline{\quad\quad}$$

$$12 \times 12 = \underline{\quad\quad}$$

$$14 \times 14 = \underline{\quad\quad}$$

$$15 \times 15 = \underline{\quad\quad}$$

10. When we write

$$(2 + 3) \times (4 + 5) = \underline{\quad\quad}$$

we mean that you must first do the additions inside the parentheses to get

$$5 \times 9$$

and then do the multiplication to get 45.

When we write

$$(2 \times 3) + (4 \times 5)$$

we mean that you must first do the multiplications inside the parentheses to get

$$6 + 20$$

and then do the addition to get 26.

Always do what is inside the parentheses first.

Is this equation correct? Do the arithmetic to find out. _____

$$(2 + 3) \times (2 + 5) = (2 \times 2) + (2 \times 5) + (3 \times 2) + (3 \times 5)$$

Can you make a product array to go with this equation?

Explain what the equation says about the array.

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